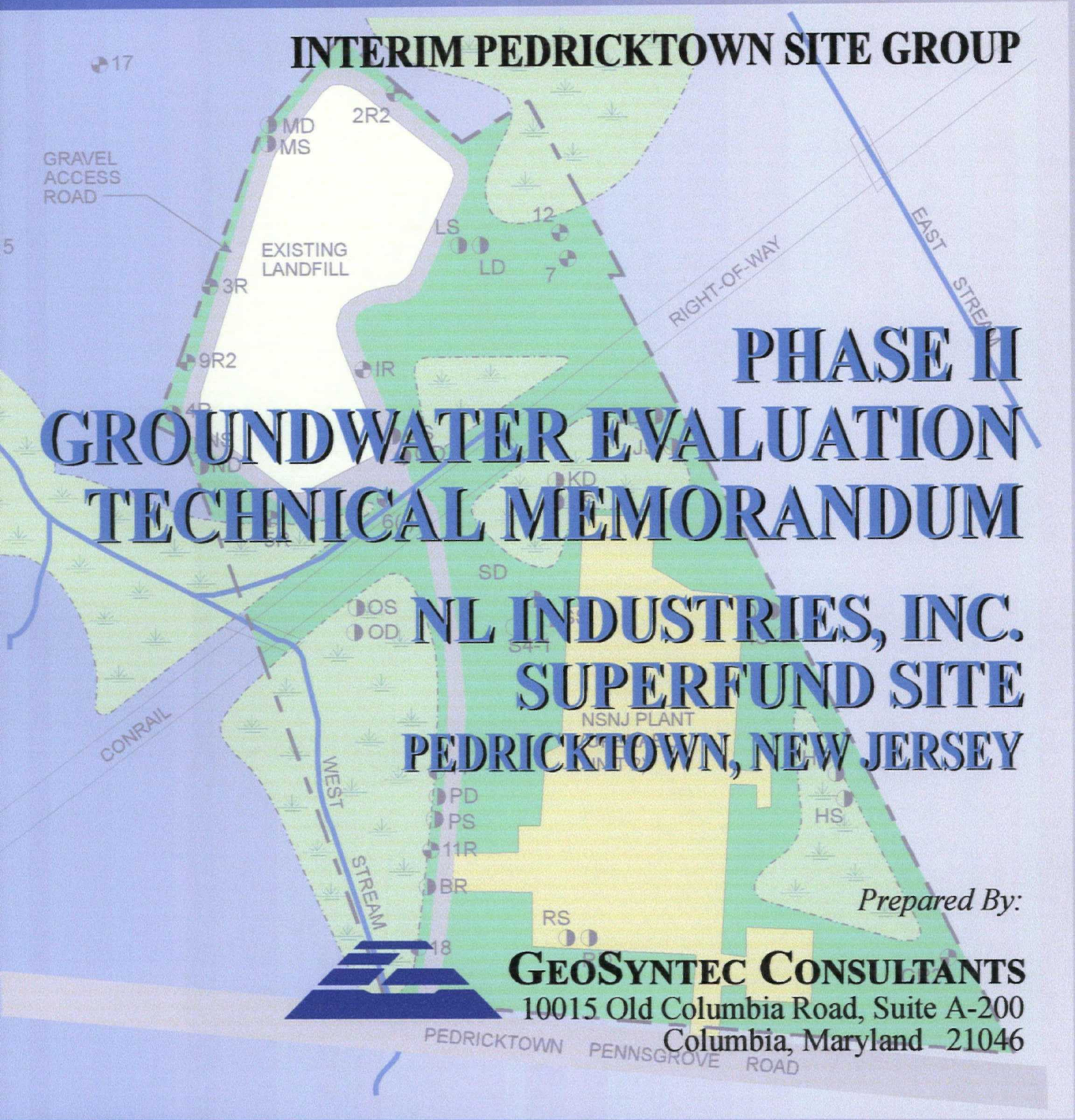
Prepared For:

INTERIM PEDRICKTOWN SITE GROUP

PHASE II GROUNDWATER EVALUATION TECHNICAL MEMORANDUM

NL INDUSTRIES, INC. SUPERFUND SITE

PEDRICKTOWN, NEW JERSEY



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Project Number ME0015-15
January 2000

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19 January 2000

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1. INTRODUCTION

1.1 Overview

In this memorandum, the results of the Phase II Groundwater Evaluation for the NL Industries site in Pedricktown, New Jersey is presented. This evaluation was performed by the Interim Pedricktown Site Group (Group) in accordance with the document entitled, *Remedial Design Work Plan for the NL Industries, Inc. Site* [GeoSyntec, July 1997](RD Work Plan). As described in the RD Work Plan, the groundwater evaluation is to be performed in two phases, each progressively building on the results of the Remedial Investigation (RI) performed in 1990 by O'Brien & Gere [O'Brien & Gere, 1990] and an evaluation of groundwater performed in 1983 by Geraghty & Miller [Geraghty & Miller, 1983]. The Group's objectives in performing these evaluations were to enhance the understanding of the site hydrogeology and to obtain sufficient data to design a remedy for groundwater.

The results of the first phase of the groundwater evaluation were reported in the document entitled, *Phase I Groundwater Evaluation Technical Memorandum* [GeoSyntec, June, 1998] (Phase I Memorandum). A summary of the results and recommendations provided in the Phase I Memorandum are provided in Section 1.2 of this report. The activities and findings of the second phase of the groundwater evaluation are presented in Sections 3 through 14 of this document. To provide relevant background for the issues addressed during the Phase II evaluation, a history of the site is presented in Section 3 along with a summary of the sources of constituents that have impacted groundwater quality.

1.2 Summary of Results and Recommendations from Phase I Groundwater Evaluation

The objectives of the first phase of the groundwater evaluation were to: (i) define current groundwater quality at the site; (ii) evaluate groundwater as a possible pathway for the transport of constituents; (iii) identify, if possible, remedial alternatives for groundwater that are more effective than the remedy selected by the United States Environmental Protection Agency (EPA); and (iv) define the scope of the Phase II groundwater evaluation. To accomplish these objectives, the Group obtained groundwater samples from 19 monitoring wells and surface-water samples from five locations. The samples were analyzed for organic and inorganic constituents. The results of the laboratory analysis of these samples were presented in the Phase I Memorandum.

Based on the data in the Phase I Memorandum, it was concluded that: (i) the quality of groundwater at the site had improved since secondary lead reclamation operations at the site ceased in 1982; (ii) the inorganic constituents in groundwater were not mobile, and organic constituents were detected infrequently and at low concentrations; therefore, there is not a complete off-site exposure pathway; and (iii) based on these results, refinements to the EPA-selected remedy may be needed to address current, rather than past (as reported in the RI), groundwater conditions.

In the Phase I Memorandum, it was stated that the quality of groundwater at the site had improved since monitoring began in 1983. This statement was based on the observed decrease in the concentrations of constituents detected in groundwater samples obtained from monitoring wells during five monitoring events between 1983 and 1997. It was also stated that constituents existed in a stationary zone (i.e., "zone of impact") and that while constituent concentrations had decreased, no change in the location of the zone of impact was observed. Furthermore, because the zone of impact had remained stationary through the monitoring period, it was concluded that no significant transport of constituents had occurred (i.e., constituents are immobile). Therefore, it follows that groundwater is not a significant pathway for transport of constituents of concern. Based on these observations, the Group believed that Remedial Action Objectives (RAOs) for groundwater could be achieved without pumping and treating groundwater. The RAOs for groundwater at the site are provided on Table 1-1.

As a result of the improvement in groundwater quality that had occurred without active remediation, the Group proposed in the Phase I Memorandum to evaluate the causes of the naturally-occurring improvement. In addition, in its comments to the Phase I Memorandum, EPA requested that additional data be obtained to further characterize the site hydrogeology and geochemistry. The Group and EPA agreed that the Group would implement a Phase II groundwater evaluation program that included installation of new monitoring wells, evaluation of site geochemistry and hydraulics, and evaluation of the condition of the former septic beds.

1.3 Summary of Phase II Groundwater Evaluation

The Phase II groundwater evaluation included: (i) the installation of monitoring wells; (ii) sampling of groundwater from on-site monitoring wells and off-site residential wells; (iii) assessment of the former septic beds as a potential source of contamination; (iv) aquifer testing; (v) evaluation of the likely capture zone of groundwater extraction wells, if they were installed; (vi) geochemical evaluation of site subsurface soils; and (vii) groundwater flow and transport modeling. Also, a subsurface investigation was performed as part of a landfill siting evaluation. Although an Explanation of Significant Differences (ESD) issued by EPA eliminated the need to construct a landfill on the site, the data obtained during the landfill siting evaluation enhanced the site subsurface database and are included herein.

The results of the Phase II groundwater evaluation generally confirmed the results of the Phase I evaluation and support the conclusion that groundwater quality consistently has improved and that there is no exposure pathway for groundwater between on-site constituents and possible off-site receptors. Furthermore, the results of the aquifer test performed during the Phase II groundwater evaluation indicate that the pump-and-treat remedy may be technically impractical to implement (see Section 1.4). Therefore, as stated in the Phase I Memorandum, in addition to being unwarranted for addressing current groundwater conditions, it may not be possible for the pump-and-treat remedy to meet the RAOs identified in the ROD.

1.4 Issues Raised During the Aquifer Test

During the aquifer test, data were collected that strongly suggest that a pump-and-treat remedy will be incapable of achieving the RAOs. The chemical data were obtained by analyzing samples of the groundwater. The analyses show that, although the extraction well was installed in the area at the site containing the greatest concentrations of constituents of concern, the constituents (especially lead and cadmium) were not prevalent in the extracted groundwater. Furthermore, the concentrations were either below the level of detection or, when they were detected, declined rapidly during pumping. These results indicate that removal of a significant mass of constituents (particularly lead and cadmium) from the aquifer is impossible. Therefore, the use of the pump-and-treat remediation technique at the site is impractical, as discussed further in Section 9.

2. PROJECT BACKGROUND

2.1 Overview

In this section, the background of the Phase I and II groundwater evaluations is presented. First, in Section 2.2, the history of the site is described. Then, in Section 2.3, the sources of constituents that have impacted groundwater quality are discussed.

2.2 Site History

The NL Industries site is located on Pennsgrove-Pedricktown Road, in Pedricktown, New Jersey. A site plan is provided as Figure 2-1, which depicts the location and layout of the site. The site was used by several organizations for the reclamation of lead. Lead reclamation involved the secondary smelting of lead from recycled material. A primary source of lead in recycled material for secondary smelting at the site was lead-acid batteries. The initial step in reclaiming lead from lead-acid batteries involved breaking the battery casings. At the NL site, as well as most other lead reclamation facilities, battery casings were broken in various locations and, at times, in a poorly controlled manner. For example, spent batteries were occasionally stockpiled at several outdoor locations at the site, and a bulldozer was sometimes driven over the batteries to crush the casings. Battery casings were also broken within the former secondary smelting facility building.

After the battery casings were broken, battery acid drained from the casings and the lead plates were removed for secondary smelting. While breaking some of the battery casings, battery acid was inadvertently released to the land surface. Lead and other constituents that have been observed in groundwater at the site were temporarily entrained in the battery acid, which flowed vertically down through the soil to groundwater. The manner in which this activity impacted groundwater is discussed in the following section.

2.3 Sources of Impacts to Groundwater and Distribution of Constituents

2.3.1 Lead Reclamation

Battery acid that was inadvertently released during the lead reclamation process is the primary source of inorganic constituents (i.e., lead and cadmium) in groundwater at the NL site. The released battery acid entrained constituents from the batteries, as well as material that the acid contacted after it was released from the battery casings. The acid flowed downward through the soil to the groundwater table, resulting in localized decreases in ambient groundwater pH and release to groundwater of the constituents contained in the acid.

During the period when battery breaking was performed, an intermittent source of battery acid and constituents affected the groundwater at the site. The limited spread of acid and entrained constituents into the aquifer proceeded gradually until it reached a dynamic equilibrium with the aquifer material and groundwater. The pH of the acid and acidic groundwater was ultimately buffered by the geochemical interaction with aquifer material (this is described in more detail in Section 11 of this document). Through buffering, the pH of the groundwater was raised, which resulted in a decrease in the solubility of the inorganic constituents and a decrease in constituent mobility. Also, geochemical reactions occurred that resulted in the sorption and precipitation of constituents. The spread of constituents in groundwater was limited by naturally occurring geochemical reactions. The geochemical interaction of acid and acidic groundwater with the aquifer material is described in greater detail in Section 11.

When secondary smelting operations ceased at the site in 1982, the release of battery acid also ceased. Since then, groundwater quality has markedly improved, as demonstrated by the results of five monitoring events since 1983 that show the zone of groundwater impact to be stationary and concentrations of constituents within the zone to be sharply declining. With each monitoring event, a smaller and smaller area has been observed to be affected and groundwater quality within the zone of impact has been observed to be improving. This is illustrated in more detail in Section 7 of this memorandum.

The total mass of inorganic constituents in the subsurface has likely remained constant since operations ceased in 1982. However, the mass of constituents in groundwater has decreased, while the mass of constituents sorbed to the aquifer material has increased. The transfer of constituent mass from groundwater to aquifer material occurs naturally, and is desirable. On Table 2-1, the change in mass of lead and cadmium that has occurred in groundwater is presented.

The average concentrations of lead and cadmium and the volume of groundwater affected were used to calculate the mass of lead and cadmium in groundwater. As summarized on Table 2-1 and described in Section 11, the mass of constituents in groundwater is much smaller than the total sorption capacity of the aquifer material (i.e., the mass of constituents that can be permanently sorbed to the subsurface soils. Also, the RAOs for constituents in soil are sufficiently high that if all of the constituent mass is transferred from groundwater to the soil, the resulting change in the concentrations of the constituents in soil will be only a few parts per million and the final concentrations of lead and cadmium in soil will be within the range of background concentrations [Pais and Jones, 1997]. The change in lead and cadmium concentrations in soil was calculated using the estimated mass of lead and cadmium in groundwater and the estimated mass of soil in the zone of impact.

2.3.2 Other Possible Sources

The EPA included constituents other than lead as constituents of concern (COCs) at the site. These additional COCs are identified on Table 2-2, and include both organic and inorganic parameters. Possible sources of these constituents are the diesel fuel storage tanks and the Conrail rail line, as described below. No investigations have been performed, as part of this evaluation, to evaluate these potential sources of COCs. Diesel fuel storage tanks were operated at the site. It is possible that some of the COCs originated from the operation of diesel tanks. Furthermore, the adjacent site located to the east was formerly operated by Exxon. Currently, groundwater at that site is monitored by Exxon and constituents related to fuel and solvents have been documented to be in the groundwater at that site through an on-going monitoring program. The former Exxon site is upgradient from monitoring wells 7, 12 and 19 and near monitoring wells 24, JS, JD.

During the performance of field activities, GeoSyntec personnel observed rail tanker cars in the Conrail line that were temporarily stopped (at times, overnight) near the site and upgradient from monitoring wells 7, 12 and 19. The rail cars were labeled as containing the volatile organic compound (VOC), vinyl chloride. Vinyl chloride was detected in groundwater samples obtained from monitoring wells 12 and 24. Vinyl chloride also strongly influences the estimation of possible risks posed by groundwater, as described in Section 13.

3. FORMER SEPTIC BED EVALUATION

3.1 Overview

A former septic bed is located in the southwest corner of the site (Figure 3-1) The former septic bed is composed of two mounds.. Both mounds, the east and west mound, are composed of soil that is mounded approximately 10 feet above the surrounding land surface. As requested by the EPA, GeoSyntec performed an investigation of the former septic bed to evaluate its potential for impacting groundwater. For the investigation, one soil boring was drilled through each mound to the water table. From each soil boring, one sample of soil was obtained and chemically analyzed. The results of this evaluation were presented in the report entitled, "Final Design Report, Remedial Design for Soil and Sediment, NL Industries, Inc. Superfund Site" [GeoSyntec, November 1999], and they are reiterated in the remainder of Section 3. Also, two monitoring wells were installed adjacent to the former septic bed and sampled to investigate groundwater quality in the immediate vicinity of the former septic bed. The results of both the soil quality and groundwater quality evaluations performed for the former septic bed are provided below.

3.2 Field and Laboratory Procedures

Two soil borings were drilled in the former septic bed using hollow-stem auger (HSA) drilling techniques. One soil boring, SBE (Soil Boring East), was drilled through the center of the east mound; and one soil boring, SBW (Soil Boring West), was drilled through the center of the west mound (Figure 3-1).

The soil borings were drilled by Hardin-Huber, Inc. (HHI) of Baltimore, Maryland using a Mobil-B57 all terrain vehicle (ATV) drill rig and 4.25-inch (10.8-cm) inside diameter augers. Split-spoon soil samples were obtained continuously throughout each boring and descriptions of the soils that were encountered were logged by the GeoSyntec geologist. The geologist also screened each soil sample using a Rae System Minirae® photoionization detector (PID) to evaluate whether or not VOCs were present in the subsurface materials that were encountered. The soil descriptions and PID readings obtained during the investigation are provided in the lithologic logs presented in Appendix A.

To evaluate the subsurface soil quality in the former septic bed, one soil sample was obtained from each soil boring and submitted for laboratory analysis. In accordance with the SAMP [GeoSyntec, 1998], each sample was intended to be obtained from a depth at which the greatest PID readings were obtained. Because no elevated PID readings were observed, and the soil samples contained no visible staining, the samples were obtained from a depth of 10 to 14 feet (3.0 to 4.3 m) below the ground surface (bgs) at the top of the mounds. This sampling interval corresponds to the depths between adjacent ground elevations and the water table. Each sample was collected in accordance with the SAMP and Quality Assurance Project Plan (QAPP) [GeoSyntec, 1998] and was submitted to Quanterra Laboratories Inc., of Pittsburgh, Pennsylvania, (Quanterra) for laboratory analysis. The samples were analyzed for low-level VOCs, base/neutral/acid (BNA) extractable compounds, priority pollutant metals, total cyanide, and radiological parameters.

3.3 Results of Soil Evaluation

The subsurface soil encountered during drilling consisted of fill material (sand and gravel) transitioning to uniform sands at a depth of approximately 10 feet (3 m) bgs. Split-spoon samples collected from each boring were screened for organic vapors using a PID. No organic vapors were detected in any of the samples obtained by GeoSyntec.

The results of the laboratory analyses of the soil samples are summarized on Table 3-1. As shown on Table 3-1, a low concentration (19 micrograms per kilogram (μg/kg)) of acetone was reported to be present in the sample obtained from SBW. No other VOCs were reported to be present in the samples. Also, as shown on Table 3-1, bis (2 ethylhexyl) phthalate was estimated to be present at concentrations of 380 micrograms per kilogram (μg/kg) in the sample from SBW and 61 μg/kg in the sample from SBE. No other BNA compounds were detected in the soil samples.

Low concentrations of arsenic, beryllium, chromium, copper, lead, nickel, and zinc were detected at concentrations above the laboratory reporting limit in both soil samples. Antimony was detected at a low concentration in the sample obtained from boring SBE. The only inorganic constituent detected for which there is an RAO is lead. Lead was detected at levels that were an order of magnitude below the RAO of 500 ppm. Each of the inorganics was detected at concentrations that fall within the expected range of background concentrations [Shacklette and Boerngen, 1984].

As shown on Table 3-2, radiological parameters were detected at low concentrations above the laboratory reporting limits. The radiological results for each of the analytes are consistent with the results of other soil samples obtained at the site. Furthermore, detectable levels of naturally occurring radiological parameters may be expected in the State of New Jersey [O'Brien and Gere, 1990].

3.4 Results of Groundwater Evaluations

Two monitoring wells, Wells 31 and 32, were installed adjacent to the former septic bed. The installation procedures for the wells are described in detail in Section 5. The results obtained from the chemical analysis of the groundwater samples obtained from monitoring wells 31 and 32 are described in Section 7. As stated in Section 7, groundwater samples from monitoring wells 31 and 32 were analyzed for: (i) total and dissolved lead and cadmium; (ii) VOCs; and (iii) radiological parameters.

Neither lead nor cadmium were detected in the groundwater samples from Wells 31 and 32. Also, no VOCs were detected at concentrations above the contract required detection limit (CRDL). The results of the analyses for radiological parameters indicated that the concentrations of gross alpha and beta in monitoring well 31 exceeded the RAOs. However, the concentrations of gross alpha and beta measured in the groundwater sample from monitoring well 32, which is located within 10 feet of monitoring well 31, and screened in a slightly deeper portion of the same water bearing zone, are lower than those reported for the sample from monitoring well 31. No radiological parameters were detected in soil samples from the former septic bed (Table 3-2), indicating that the former septic bed is not a source for these parameters. However, due to the variability in the concentrations of these constituents in monitoring wells 31 and 32, it is possible that a localized source of radiological parameters (e.g., naturally occurring source minerals) exists near the former septic bed.

Overall, the results of the chemical analysis of soil and groundwater samples did not identify the former septic bed as a significant source of the constituents found in groundwater at the site.

4. LANDFILL SITING EVALUATION

4.1 Overview

GeoSyntec performed a subsurface investigation as part of activities related to the siting and design of a landfill at the site. The investigation was performed in accordance with New Jersey Administrative Code (NJAC) 7:26-2A. After the landfill site evaluation was performed, the EPA issued an ESD allowing the off-site disposal of remediation wastes generated from the remedial action for the site, therefore, eliminating the need to construct a landfill at the site. The results of the landfill siting evaluation are presented in this document, because the lithologic and hydraulic data obtained in the investigation are relevant to the evaluation of groundwater at the site.

Although construction of an on-site landfill was not included in the final design for the soil and sediment remediation, the information obtained from these soil borings was used during the Phase II groundwater evaluation to refine the three dimensional lithologic model of the site, confirm the presence of the confining clay layer in the area, and quantify the hydraulic conductivity and various geotechnical and geochemical properties of the clay layer. The methods used to complete the soil borings and the information obtained from each boring is provided below.

4.2 Methods

GeoSyntec drilled four soil borings in the area east of the current NL Industries, Inc., Landfill (Figure 4-1). On 21 and 22 July 1998, Hardin-Huber, Inc. of Baltimore, Maryland, (HHI) drilled three shallow (i.e., 25-feet deep) and one deep (i.e., 52-feet deep) soil borings in the area east of the existing NL Industries, Inc., landfill and north of the Conrail right-of-way as part of the landfill siting evaluation. As shown on Figure 4-1, the shallow soil borings were designated LFE-1, LFE-2, and LFE-3, and the deep soil boring was designated LFE-4. The soil borings were drilled using a Mobil B-57 all-terrain vehicle (ATV) drill rig equipped with 4.25-inch inside diameter (ID) hollow stem augers. During the drilling activities, standard penetration tests (SPT) were performed continuously using a 2-inch diameter split-spoon sampler. A GeoSyntec geologist evaluated the contents of each split spoon sample and recorded the lithology of each boring in the lithologic logs provided in Appendix A.

To evaluate the various physical and chemical properties of the clay confining unit in the proposed landfill area, GeoSyntec obtained undisturbed soil samples at soil boring location LFE-4. Samples of clay were obtained using Shelby tubes at two-foot intervals from a depth ranging from 34-feet to 40-feet. The sample obtained from the 34-feet to 36-feet interval was submitted to GeoSyntec's Geomechanics and Environmental Laboratory in Alpharetta, Georgia for analysis. The sample was analyzed for hydraulic conductivity in accordance with the American Society for Testing and Materials method D 5084 (ASTM D 5084), as-received moisture content by ASTM D 2216, Specific Gravity by ASTM D 854, and Cation Exchange Capacity using EPA method 9081. HHI abandoned each borehole by tremie-grouting from the bottom of the borehole to the land surface using a bentonite cement mix.

4.3 Results

As shown in Appendix A, a clay layer consisting of a red and gray or tan mottled clay was identified in each of the borings drilled during the landfill siting evaluation, except LFE-3. LFE-3 was terminated at a depth shallower than the depth of the clay layer. The thickness of the clay layer was at least two feet thick at soil boring location LFE-2 and at least 8-feet thick at LFE-1. The clay layer ranged in depth from 18-feet bgs at LFE-1 to 32 -feet bgs at LFE-4. These depths are consistent with the depths encountered in a previous investigation [GeoSyntec, 1983], in which the clay layer was encountered between 20 and 40 feet bgs.

As shown in Appendix B, the results of the geotechnical analysis of the clay indicated the following: (i) hydraulic conductivity of the sample was 8.0×10^{-8} centimeters per second (cm/s); (ii) the as-received moisture content of the sample was 16.7 percent; (iii) the specific gravity of the sample was 2.66, and; (v) the cation exchange capacity of the sample was 6.1 milliequivalents per gram (meq/g).

In comments provided by the EPA on the results of the *Phase I Groundwater Evaluation Technical Memorandum*, the EPA indicated that it desired a better understanding of the lithology of the site. The EPA stated that drilling logs for monitoring wells 7 and 12 do not indicate clay to be present between the unconfined and the first confined (semi-confined) aquifer. Although requested, EPA was not able to provide a lithologic log for monitoring well 19. In the drilling logs for monitoring wells 7 and 12, the first occurrence of clay was reported at a depth of approximately

50 feet bgs. During the installation of soil borings as part of the landfill siting evaluation, clay was consistently observed at depths ranging from 18 to 32 feet. The discrepancy between the lithologic logs of monitoring wells 7 and 12 and the results of the landfill siting evaluation indicates that if the clay is in fact absent between the unconfined and semi-confined aquifer, its absence is limited to a small area near monitoring wells 7 and 12. It is also possible, that the clay is present at monitoring wells 7 and 12, but it was simply not included in the drilling logs for monitoring wells 7 and 12. A sample of the clay was found to have a vertical hydraulic conductivity of 8.0×10^{-8} cm/s, which identifies the clay layer as an aquitard. Furthermore, the clay layer was encountered during the installation of monitoring wells 24 and 26 (Section 5) which also documents the continuity of the aquitard. A conceptual subsurface model (view from north and east) is provided as Figure 4-2.

5. WELL INSTALLATION

5.1 Overview

As part of the Phase II groundwater evaluation, 12 new monitoring wells, a pumping well, and an observation well were installed at the locations shown on Figure 5-1. The new monitoring wells were installed to obtain groundwater samples from areas of the site not previously investigated. The groundwater data obtained from the newly installed monitoring wells were used to evaluate trends of constituents of concern in groundwater in the zones of impact. Several monitoring wells were placed in locations that supplemented the database regarding the completeness of the confining clay layer east of the NL landfill, as requested by the EPA and as described in Section 4. The rationale for the location of each new monitoring well is provided on Table 5-1.

GeoSyntec used the lithologic data obtained during the installation of the monitoring wells to refine the three-dimensional subsurface model and cross-sections of the site. A summary of the activities and results of the monitoring well installation is provided below. Descriptions of the methods used to obtain and analyze the groundwater samples and the results of the chemical analyses are provided in Section 7. The pumping well and observation well were installed to perform an aquifer test, which is described in Section 11.

5.2 Site Lithology

Based on the findings of previous investigations, the NL site is underlain by three separate water-bearing formations: (i) an unconfined (i.e., water table) aquifer; (ii) the first-confined aquifer, and; (iii) the second confined aquifer [Geraghty & Miller, 1983 and O'Brien & Gere, 1990], as shown on Figures 4-2 and 5-2. In the reports of previous investigations, the unconfined aquifer was defined as the Cape May Formation; the first confined aquifer was reported to be below a confining clay unit that may or may not be continuous and in an upper unit of the Magothy-Raritan Formation; and the second confined aquifer was described to be in a lower unit of the Magothy-Raritan formation.

The lithologic information obtained during the previous subsurface evaluations are provided in Appendix A. As shown in Figures 4-2 and 5-2, a continuous clay layer was observed at a depth ranging from approximately 20-feet to 40-feet below the land surface.

5.3 Monitoring Well Installation

The borings for the newly installed monitoring wells, except monitoring well 24, were advanced in the unconfined aquifer using HSA drilling techniques. Monitoring well 24, which is screened in the first confined (i.e., the semi-confined) aquifer, was drilled using mud-rotary techniques. Each of the new monitoring wells was installed by HHI, except monitoring wells 33 and 34. Monitoring wells 33 and 34 were installed by Unitech Drilling Company, Inc., of Malaga, New Jersey.

Each of the borings, except monitoring well 24, were drilled using 4.25-inch (10.8 cm) inside diameter HSAs. Split-spoon soil sampling and standard penetration tests (SPTs) were performed continuously throughout each boring, except in locations where well couplets (i.e., well pairs) were installed (e.g., wells 22 and 23). At these locations, soil sampling and SPTs were performed only in the deeper boring. The descriptions of the soils encountered and results of the SPTs were logged by the on-site GeoSyntec geologist. The geologist also screened soil samples using a PID to evaluate whether or not VOCs were present in the subsurface locations. The soil descriptions, PID readings, SPT results, and other observations made during the drilling activities were recorded on the Lithologic Logs provided in Appendix A.

After the borings were completed at each location, except monitoring well 24, the hollow stem augers were left in place and monitoring wells were constructed within the augers. The monitoring wells installed at the NL site were constructed of 2-inch diameter schedule 40 polyvinyl chloride (PVC) riser pipe and 2-inch diameter schedule 40 PVC screens (0.10-inch, slotted). After the wells were placed, a sand filter pack was added to a minimum height of two feet above the top of the screen section. A minimum 2-foot thick layer of bentonite pellets was installed above the sand filter pack. The annular spaces around the wells were then grouted from the top of the bentonite seal to the land surface using a bentonite/portland cement slurry. Each of the monitoring wells were completed with an approximate 30-inch stick-up, steel outer casing, and a concrete pad. The depth, screened interval and top of casing elevations for each of the newly installed monitoring wells are provided on Table 5-2.

Monitoring well 24, a deeper well, was installed as a double-cased well to prevent any possible vertical migration of constituents from the unconfined aquifer to the first confined aquifer. To accomplish this, a 12-inch diameter roller cone was used to drill through the water table aquifer and into the clay layer that separates the aquifers. An outer steel casing was then installed and grouted into the clay layer (at a depth of 26 feet to 42 feet bgs) separating the first confined aquifer from the water table aquifer. After the outer casing was set, a smaller diameter roller cone was used to remove the cuttings from the outer casing and complete the boring to a depth of 74 feet below land surface. The PVC well screen and riser were inserted inside the outer casing to the bottom of the boring. The monitoring well was completed by installing the sand filter pack, bentonite seal, and grout as described above. The monitoring well was completed with an approximate 30-inch stick-up, and steel casing. The depth, screened interval, and top of casing elevation for monitoring well 24 are provided on Table 5-2.

Upon the completion of each new monitoring well, the wells were developed by the drilling subcontractor using submersible pumps. GeoSyntec's on-site representative monitored well development.

Samples of soil were obtained from the borings drilled during the construction of the monitoring wells, as described in Section 6. The specific parameters and methods for the analyses of the soil samples are provided on Table 5-3.

5.4 Pumping Well and Installation

As requested by the EPA, GeoSyntec installed a pumping well, PW, and observation well, OW, at the NL site for use during aquifer testing. The purpose of installing these wells was to have a fully penetrating extraction well (i.e., PW) and a fully penetrating observation well (OW) for use during the aquifer test. The locations of these wells are provided on Figure 5-1. The locations of these wells were selected to be near monitoring wells KS and KD, which have historically contained the higher concentrations of groundwater constituents.

Prior to installing wells PW and OW, pilot borings were drilled by Earth Matters, Inc. The pilot borings were installed to evaluate the lithology in detail and to measure the depth to the clay layer underlying the unconfined aquifer. The pilot borings were drilled using a 3.25-inch diameter HSAs. Split spoon sampling and SPTs were performed continuously in the pilot boring for pumping well PW. Descriptions of the aquifer material encountered are provided in Appendix A.

Soil samples were obtained from the pilot boring for pumping well PW and submitted to Hardin-Kight Associates, Inc. of Glen Burnie, Maryland for grain size analysis. The soil samples submitted for laboratory analysis were obtained at two-foot intervals (i.e., from each split spoon sample) from a depth of 6 feet to 26 feet. The results of the sieve analyses were submitted to Johnson Well Screens, Inc., the manufacturer of the well screen used in PW, for evaluation and design of the well screen.

On 4 May 1999, Earth Matters, Inc. installed wells PW and OW at the locations shown on Figure 5-1. Pumping well PW was drilled using 12-inch outside diameter HSAs to a depth of 26.5-feet bgs. The well was constructed using a 6-inch diameter schedule 40 PVC, 0.20-inch opening continuously wound well screen and 6-inch diameter riser. Well OW was drilled using 4.25 inch diameter HSAs to a depth of 26-feet bgs. The well was constructed using 2-inch diameter schedule 40 PVC riser and 0.10-inch, slotted screen. After the wells were constructed, the sand filter pack (Toney Drilling Supply Company–No. 1 Quartz Silica) and bentonite seal were installed. Each well was completed by grouting the annular space to the land surface with a bentonite/portland cement slurry. The depth and screened interval of wells PW and OW are provided on Table 5-2.

6. SOIL SAMPLING

6.1 Overview

During the Phase II groundwater evaluation, GeoSyntec performed drilling and soil sampling activities at the NL site to: (i) investigate the former septic bed (as described in Section 3); (ii) perform a landfill siting evaluation (as described in Section 4); and (iii) install wells at the site (as described in Section 5). While performing these activities, GeoSyntec obtained a significant amount of data regarding subsurface conditions. The data that were obtained were useful in supplementing existing data, which allowed for a more complete evaluation of the subsurface conditions at the site as described below.

6.2 Soil Sample Analysis

GeoSyntec obtained soil samples from the unconfined aquifer material at four new monitoring well locations and two locations in the former septic bed during the drilling and subsurface sampling activities performed as part of the Phase II groundwater evaluation. During drilling of monitoring wells 26, 28, 29 and 34, GeoSyntec obtained soil samples for chemical analysis to evaluate subsurface soil quality and lithologic properties in the unconfined aquifer. The samples from each location were obtained at approximate 4- to 6-foot intervals immediately below the water table. The results of the chemical analysis of the soil samples obtained during the Phase II groundwater evaluation are described on Tables 6-1 through 6-3.

As shown on Table 6-1, lead concentrations in soils in the unconfined aquifer ranged from 19.0 parts per million (19.0) in soil sample SBE to 0.56 ppm in the soil sample obtained at monitoring well 34. The concentrations of lead detected in subsurface soils are at least two orders of magnitude less than the site RAO concentrations for lead of 500 ppm. The low concentrations of lead in the samples obtained from the monitoring well locations, in conjunction with the geochemical analyses described in Section 11, indicate that residual lead concentrations in the aquifer material are not sufficient to act as a continuous source of lead contamination in the groundwater. Furthermore, they are within the expected range for background concentrations [Pais and Jones, 1997].

As shown on Table 6-2, acetone (19 ug/kg) was identified in soil sample SBW and was the only VOC detected above the CRDL in any of the soil samples obtained during the Phase II groundwater evaluation. Acetone is commonly used in laboratories and is often a spurious artifact of laboratory analyses. It is likely that the acetone reported herein is a laboratory artifact rather than a constituent present at the site. In fact, none of the VOCs identified in the ROD were detected in any of the subsurface soil samples obtained during the Phase II groundwater evaluation.

As shown on Table 6-3, low concentrations of gross alpha and gross beta constituents were detected at similar levels in each of the soil samples obtained during the Phase II groundwater evaluation. Several low concentration radiological isotopes were identified by gamma spectroscopy in each of the soil samples obtained. Also, low concentrations radiological isotopes were identified using alpha spectroscopy from the soil sample obtained at monitoring well 28. As stated in the RI, portions of the State of New Jersey contain detectable levels of radioactivity [O'Brien & Gere, 1990]. Therefore, the radiological parameters observed may be naturally occurring and not a significant concern.

In addition to the constituent analyses described above, GeoSyntec submitted soil samples obtained during the installation of monitoring wells to the laboratory for general chemistry analysis, and three of the samples were submitted for petrographic and mineralogical analyses, as described in Section 5. The results of the general chemistry and mineralogical analyses are summarized on Tables 6-4 and 6-5. The general chemistry parameters obtained from the subsurface soil samples were used to evaluate the fate and transport of constituents in the groundwater, as described in Section 12. The results of the mineralogical tests performed on the subsurface samples are provided in Appendices C and D, respectively, and were used to evaluate the geochemical characteristics of the subsurface.

7. GROUNDWATER SAMPLING

7.1 Overview

GeoSyntec obtained groundwater samples from 24 monitoring wells during the Phase II groundwater evaluation using low-flow sampling techniques. As shown on Table 7-1, 22 groundwater samples were obtained from monitoring wells screened within the unconfined aquifer, and two groundwater samples were obtained from monitoring wells screened within the first confined (semi-confined) aquifer. Figure 7-1 depicts the locations of each of the monitoring wells sampled during the Phase II groundwater evaluation. These sampling locations were selected to: (i) verify the data obtained during previous investigations; (ii) evaluate areas where incomplete or insufficient data had been obtained during previous investigations; (iii) evaluate whether constituents identified during previous investigations migrated to downgradient locations; (iv) identify potential trends in constituent concentrations, and; (v) obtain additional hydrogeological information requested by EPA. A summary of the constituents for which each of the samples were analyzed is provided on Table 7-1; the construction details of the monitoring wells sampled are provided on Table 7-2.

GeoSyntec performed the sampling for the Phase II groundwater evaluation during the period between 8 July 1998 and 23 July 1998, with several exceptions. The groundwater sample obtained from monitoring well 26 was obtained on 23 September 1998. Also, inconsistencies were noted in the data obtained from the July 1998 sampling event. The concentrations of total and dissolved inorganics are typically similar in all monitoring wells sampled at the site during both phases of the groundwater evaluation. However, for the sample obtained from OS in July 1998, the values for total and dissolved lead varied widely. To evaluate this inconsistency, monitoring well OS was resampled on 23 September 1998. The concentrations of total and dissolved lead in the sample obtained from OS on 23 September 1998, were similar (Table 7-3). Additionally, due to delays in obtaining site access, sampling of monitoring well Exxon Well No. 2 was performed on 26 January 1999, and the samples obtained from monitoring wells 33 and 34 were obtained on 19 May 1999 and 20 May 1999, respectively. The methods used to obtain and analyze the monitoring well samples and the results of the chemical analyses are presented below.

7.2 Synoptic Water-Level Measurements

Prior to commencing sampling activities, the depth to groundwater was measured at each of the existing and newly installed groundwater monitoring wells sampled during the Phase II groundwater investigation. Groundwater levels at these locations were also obtained periodically during well purging to verify that drawdown within each well was minimized during the well purging process. The groundwater levels obtained from each well sampled during the Phase II groundwater evaluation are provided on the Groundwater Sampling Forms provided in Appendix E.

Prior to obtaining water-level measurements, each monitoring well was opened so that the water level within each well could equilibrate to atmospheric pressure. After equilibration, a clean, electronic measuring device was used to measure the depth from the top of the casing (PVC riser) to the water surface. To minimize the potential for cross-contamination between wells, the measuring device was rinsed with deionized water between deployment at each location.

During the performance of the groundwater evaluations, GeoSyntec noted that the monitoring well casings, which had been installed at various times since 1983, were not surveyed relative to a consistent datum. Therefore, the elevations for several monitoring well casings were resurveyed. Groundwater levels were remeasured on 16 December 1999. A potentiometric surface map for the site, constructed from the 16 December 1999 water level measurements and the new survey data is provided as Figure 7-2.

7.3 Field Methods and Field Parameter Monitoring

7.3.1 Preparation for Sampling

Prior to sampling, each monitoring well was purged using stainless steel submersible pumps (i.e., Grundfos Rediflo 2®) in accordance with the low-flow sampling techniques described in the Sampling, Analysis and Monitoring Plan (SAMP) contained in the RDWP [GeoSyntec 1997]. During well purging, the field parameters, temperature, pH, specific conductance, dissolved oxygen, and turbidity, were monitored using portable field instruments. The field parameter readings obtained at each location were recorded on the Groundwater Sampling Forms, provided in Appendix E. Well purging was continued until field parameters stabilized, or a minimum of four hours of purging was performed.

After purging was completed, groundwater samples were obtained by filling clean, sampling containers directly from the discharge tubing of the pump at each wellhead. Samples to be analyzed for dissolved metals analysis were filtered in the field prior to being placed in the sample containers. The samples were filtered using disposable, in-line filters (i.e., GeoTech® Disposa-filter (45 micron)).

To minimize the potential for cross-contamination between wells, the submersible pumps were decontaminated prior to deployment at each location in accordance with the decontamination procedures outlined in the RDWP [GeoSyntec 1997]. In addition, new, dedicated Teflon® discharge tubing and in-line filters were used at each monitoring well location.

At the beginning of each day, instruments used to obtain the field parameter measurements were calibrated in accordance with manufacturer's recommendations and the Quality Assurance Project Plan (QAPP) [GeoSyntec 1997]. On a few occasions, field instrument failure prevented portions of the field parameter data from being obtained or caused inconsistencies in the data. When this occurred, members of the sampling team noted the incidents on the Groundwater Sampling Forms (Appendix E) and, when possible, performed corrective actions. These corrective actions included, but were not limited to, replacing malfunctioning instrumentation, repairing field instruments, and/or retaining aliquots of the effluent for analysis at a later time.

A summary of the field parameter readings obtained during the groundwater monitoring well sampling activities is provided on Table 7-4. A brief discussion of the results for each parameter measured in the field is provided below.

7.3.2 pH Measurement

The pH of groundwater is an important factor in determining the solubility of metals in groundwater. As shown on Table 7-4, pH values ranged from 3.0 in monitoring well SD to 6.8 in monitoring well BR.

To evaluate changes in pH values over time, GeoSyntec constructed isopleth drawings for the 1998, 1997, and 1983 data obtained at the site (Figures 7-3 through

7-5). As shown on Figure 7-3, an area of relatively low pH (i.e., < 4.0) is apparent in the north central portion of the site. The presence of relatively low pH values in this area is generally consistent with the historical data. However, by comparing the 1983 and 1998 data, the pH values across the site are generally increasing. The increasing trend evident in the pH data is related to the mechanisms described in Section 2 and indicates that groundwater quality at the site is improving. The increasing trend of pH results in general decreased solubility of inorganics in the groundwater. Therefore, if this trend continues as expected, further significant improvement to the groundwater quality regarding metals concentrations will occur.

7.3.3 Specific Conductance

The specific conductance values reported on Table 7-4 range from 0.09 units in well JS to 8.74 in well SD. Specific conductance is a measure of the electrical conductivity of a groundwater system, which is directly related to the concentration of dissolved solids in the groundwater. Generally, specific conductance is higher in samples containing greater concentrations of inorganic constituents.

7.3.4 Reduction-Oxidation (Redox) Potential

The reduction-oxidation (redox) potential of groundwater is a measure of the electrochemical potential and is used to evaluate whether conditions in the groundwater are chemically reducing or oxidizing. The redox potential values reported on Table 7-4 range from + 426 millivolts (mv) at well 23 to –325 mv at well 33. This variation in redox potential generally indicates that a range of oxidizing and reducing conditions exist in groundwater at the site.

7.3.5 Dissolved Oxygen

The dissolved oxygen values reported on Table 7-4 range from 0.13 parts per million (ppm) at well 24 to 10.95 ppm at Exxon Well No. 2. Dissolved oxygen concentrations are an indicator of general groundwater quality. Typically, when groundwater conditions are chemically reduced, dissolved oxygen concentrations are lower. This can be related to several factors including biochemical redox reactions that naturally occur.

7.3.6 Turbidity

The turbidity values reported on Table 7-4 range from 0.5 to 1100 nephalometric turbidity units (NTUs). The turbidity of a sample is an indirect measure of the amount of material suspended in the sample. Often, the suspended material is soil and sediment introduced during sampling.

Although turbidity in groundwater samples may be caused by colloidal particles that may exist in the aquifer, high turbidity levels (i.e., greater than 10 NTUs) are more often the result of agitation of the groundwater within a well during sampling. Agitation of the groundwater within a well causes sediments within and near the well to become suspended in the water column. When a sample is obtained, these suspended materials become incorporated into the sample and are subsequently analyzed with the sample. Because inorganics such as lead and cadmium, have an affinity to sorb to soil and sediment particles, the analysis of a sample containing these particles (i.e., a turbid sample) will result in an artificially increased detection of inorganics. It is also important to understand that even in low-turbidity samples, when the particles present in the sample contain relatively high concentrations of sorbed constituents, a commensurate high concentration of constituents may be measured when the sample is analyzed.

While low-flow sampling techniques, as used during sampling at the NL site, are intended to reduce the effects of sampling-induced turbidity, this technique is not without limitations. As shown on Table 7-5, several samples obtained using the low-flow sampling technique exhibited relatively high turbidity levels. Also, as shown on Table 7-5, concentrations of dissolved lead in some of the samples containing elevated turbidity levels are considerably lower than the total lead concentrations detected in the same samples. The discrepancy between detected levels of total and dissolved lead is likely the result of desorption of metals from soil particles in the unfiltered samples during the acidic extraction step of the laboratory analysis.

7.4 Laboratory Methods

As shown on Table 7-1, each groundwater sample obtained from the 24 monitoring wells sampled during the Phase II groundwater evaluation was analyzed for VOCs, total and dissolved lead, and total and dissolved cadmium. In addition, the samples obtained from the newly installed monitoring wells and Exxon Well No. 2 were analyzed for radiological parameters and general chemistry (Table 7-5). The laboratory analyses were performed by Quanterra Laboratory Services, Inc. (Quanterra) of Pittsburgh, Pennsylvania, except radiological parameters which were analyzed by Quanterra of St. Louis, Missouri.

7.5 <u>Laboratory Results</u>

7.5.1 Overview

The results of the laboratory analyses of the groundwater samples are summarized on Tables 7-3 and 7-7 through 7-10. For each of the analyses performed, a brief discussion of the results is provided below. In evaluating the results, the data were compared to historic data and to the RAOs defined in the ROD. On Table 7-11, the historical groundwater data for the site is summarized. Table 7-12 summarizes constituents detected in the groundwater that exceeded the RAOs during the Phase II groundwater evaluation. A description of the EPA laboratory qualifiers for organic and inorganic constituents used in the tables is provided in Appendix F.

7.5.2 Volatile Organic Compounds (VOCs)

Table 7-7 summarizes the VOC concentrations detected in groundwater at the site during the Phase II groundwater evaluation. As specified in the ROD, the VOCs of concern in groundwater at the site include: 1,1-dichloroethane (DCA), 1,1-dichloroethene (DCE), tetrachloroethene (PCE), and vinyl chloride. A brief discussion of the results for each of the VOCs identified as COCs is provided below.

1,1-Dichloroethane (DCA)

As shown on Table 7-7, DCA was detected at a concentration of 9.2 μg/ L in the groundwater sample obtained from monitoring well BR. DCA was also detected at estimated concentrations of 0.43 μg/L and 0.13 μg/L in monitoring wells 12 and 24, respectively. The concentrations of DCA detected during the Phase II groundwater evaluation are significantly lower than the RAO of 70 μg/L.

1,1-Dichloroethene (DCE)

As shown on Table 7-7, DCE was detected at a concentration of 11 μg/L in the groundwater sample obtained from monitoring well BR. This concentration slightly exceeds the RAO of 2 μg/L. DCE was detected at a concentration of 13 mg/L in the sample from monitoring well BR in 1997. DCE was also reported at an estimated concentration of 0.12 μg/L in monitoring well 11 in 1997. DCE had previously been detected in monitoring well 11 at concentrations of 170 μg/L (1989 data) and 210 μg/L (1990) data. These data show that the constituents of DCE in groundwater at monitoring wells BR and 11 are declining.

Tetrachloroethene (PCE)

As shown on Table 7-7, PCE was detected at a concentration of 3.0 μg/L in the groundwater sample obtained from monitoring well BR. This reported concentration slightly exceeds the RAO of 1μg/L. PCE was reported at a concentration of 2.9 μg/L in the sample from monitoring well BR in 1997. PCE was also detected in monitoring well 11 at an estimated concentration of 0.28 μg/L. PCE had previously been detected in monitoring well 11 at concentrations of 180 μg/L (1989 data) and 210 μg/L (1990) data.

Vinyl Chloride

As shown on Table 7-7, vinyl chloride was detected at concentrations of 13 μg/L and 4.1μg/L in monitoring wells 12 and 24, respectively. These wells are screened within the first confined (semi-confined) aquifer. The vinyl chloride concentrations reported for the sample obtained from monitoring wells 12 and 24 exceed the RAO of 2 μg/L (practical quantitation limit). Vinyl chloride was not detected in any of the other monitoring wells sampled during the Phase II groundwater evaluation (i.e., wells screened within the unconfined aquifer). As described in Section 2, it is possible that the source(s) for vinyl chloride and possibly other VOCs are not related to the former operation of the NL site.

VOCs were detected infrequently and sporadically varied at the site. The data obtained from the recent sampling events (i.e., 1997 and 1998) show that VOC concentrations have generally decreased significantly. Because the VOCs detected were not concentrated in one area and because the VOC concentrations have declined, it is not necessary to pursue a remedial action to address VOCs in groundwater.

7.5.3 Inorganics

As previously discussed, groundwater samples obtained from each monitoring well sampled during the Phase II groundwater evaluation were analyzed for total and dissolved lead and cadmium. Both lead and cadmium were identified at concentrations exceeding their respective RAOs in several monitoring wells. Discussions of the results for lead and cadmium are provided below.

Lead

As shown on Table 7-3, total lead was detected at concentrations exceeding the RAO of 10 µg/L in the samples obtained from the following monitoring wells: OS (281 µg/L), SD (25.6 µg/L (estimated)), 27 (19.9 µg/L), 28 (15.4 µg/L), and 30 (37.4 µg/L). Dissolved lead concentrations exceeded the RAO in these same wells. The concentrations of total and dissolved lead reported during the Phase II groundwater evaluation are generally lower than those reported during previous investigations performed at the site.

To identify changes in the distribution of lead in groundwater, GeoSyntec used the current total lead data to construct the zone of impact drawing provided on Figure 7-6. The current zone of impact, based on the Phase II groundwater evaluation data was compared to the zone of impact drawings on Figures 7-7 through 7-10, which were constructed using historical data obtained at the site (i.e., 1997, 1989/1990, 1988 and 1983, respectively). Also, in Figures 7-11 and 7-12, the vertical distribution of lead is shown using 1998 and 1983 data, respectively. As shown in the vertical sections and the plan view, the extent of the zone of impact has decreased over time.

Based on these comparisons, it is evident that lead concentrations in groundwater across the site have decreased considerably; also the spatial distribution of lead in groundwater has decreased. From these comparisons, it is also evident that the zone of impact has remained stationary over time. Furthermore, no significant increase in lead concentrations has occurred in wells downgradient from the zone of impact. (An apparent increase in the concentration of lead in samples from monitoring wells 15 and 17 was noted between 1989 and 1997. However, because the change was small, the change may be attributed to sampling variability. The concentrations detected were below the RAO for lead. Furthermore, the results obtained from the samples from monitoring wells 33 and 34 show that lead in groundwater previously detected at monitoring wells MS and MD does not extend downgradient). Therefore, it is clear that the mass of lead in groundwater is decreasing. Between 1983 and 1998, the estimated mass of lead in groundwater has decreased from approximately 100 Kg to approximately 4 Kg (Table 2-1).

Because the zone of impact is shrinking and lead concentrations are decreasing, it is apparent that the groundwater is generally improving. The evidence provided by the changes in the groundwater quality over time indicates that lead is naturally being removed from groundwater at the site.

Cadmium

As shown on Table 7-3 total cadmium concentrations exceeded the RAO of 4 µg/L in 12 of the 24 monitoring wells sampled during the Phase II groundwater evaluation. Dissolved cadmium concentrations, which were generally slightly lower than the total cadmium concentrations, exceeded the RAO in the same monitoring wells. The concentrations of cadmium (total and dissolved) reported during the Phase II groundwater evaluation were generally lower than those reported during previous sampling events where historical data existed (Table 7-11).

Similar to the evaluation of the lead data, GeoSyntec constructed zone of impact drawings for the current and historical (i.e., 1998, 1997, and 1989) cadmium data (Figures 7-13 through 7-16). As shown in Figures 7-13 through 7-16, the zone of impact for cadmium has decreased both in spatial distribution and concentration (i.e., reduced mass) over time. As for lead, the data for cadmium also confirm that groundwater quality is improving. Between 1988 and 1998, the estimated mass of cadmium in groundwater has decreased from 32 Kg to 6.4 Kg (Table 2-1).

<u>Radiological Parameters</u>

Table 7-8 summarizes the concentrations of gross alpha and gross beta detected in groundwater at the site. Concentrations of gross alpha were detected above the RAO of 15 picocuries per liter (pCi/L) in monitoring wells 28 (51.4 ± 7.0 pCi/L) and 31 (280 ±- 29 pCi/L). Concentrations of gross beta exceeded the RAO of 4 pCi/L in the following wells: 22 (5.06 ± 1.04 pCi/L), 23 (9.66 ± 1.69 pCi/L), 27 (16.0 ± 2.0 pCi/L), 28 (106 ± 11 pCi/L), 29 (6.06 ± 1.48 pCi/L), 30 (12.8 ± 3.0 pCi/L), 31 (109 ± 11 pCi/L), 32 (8.68 ± 1.58 pCi/L), 33 (12.1 ± 3.3 pCi/L), and Exxon Well No. 2 (7.25 ± 1.68).

Concentrations of both gross alpha and gross beta exceeding the RAOs have been reported in various monitoring wells during previous investigations. Because the Phase II groundwater evaluation was the first time the radiological parameters were analyzed in samples obtained from the newly installed monitoring wells and Exxon Well No. 2, a comparison with historical data could not be performed. However, radiological parameters were generally detected in the deeper zone of the water table aquifer. Their general absence in the shallow zone may indicate that they occur naturally. Had the source been former site operations, it is expected that they would be more prominent in the shallow zone.

During the Phase II groundwater evaluation, GeoSyntec also performed specific isotope analyses of radiological parameters using alpha spectroscopy in each of the newly installed monitoring wells and Exxon Well No. 2 and in selected wells using gamma spectroscopy (Table 7-9).

General Chemistry Parameters

GeoSyntec obtained samples from specific wells for analysis of various general chemistry parameters. The results of these analyses are summarized on Table 7-10. The results of these analyses were used in the geochemical evaluation described in Section 11. The data were also used in the fate and transport model, as described in Section 12.

Summary

The detection of parameters other than lead and cadmium were generally infrequent. Where historic data exist, recent detections of parameters within the same locations were typically lower than previous detections. As described, many of the parameters were detected at low concentrations relative to RAOs. VOCs were detected infrequently and VOC concentrations have declined. Radiological parameters were detected almost exclusively in the deeper zone, therefore, they may be naturally occurring. Radiological parameters are inorganic and tend to react as other inorganics in the subsurface (they tend to be immobile). Therefore, based on current groundwater quality, lead and cadmium are the only parameters in groundwater that are significant relative to their occurrence at the site and the possible implementation of a remedy for groundwater.

7.6 Quality Assurance/ Quality Control

7.6.1 Quality Assurance/Quality Control Samples

In accordance with the SAMP [GeoSyntec 1998], quality assurance/quality control (QA/QC) samples were obtained to evaluate the accuracy and precision of the field and laboratory analytical techniques. The QA/QC samples obtained by GeoSyntec included equipment rinsate blanks prepared daily, blind duplicate samples, matrix spike (MS) samples, matrix spike duplicate (MSD) samples, and trip blanks. The QA/QC samples were analyzed for the same constituents as the groundwater monitoring well samples, except for the trip blanks. Trip blanks were analyzed only for VOCs.

7.6.2 Data Validation

The data obtained during the Phase II groundwater evaluation were validated according to the methods described in the RDWP. The laboratory data were validated by Premier Environmental Services of Merrick, New York. The validation methods included a review of the data for precision, accuracy, comparability, completeness, and for the appropriateness of the testing methodologies. As part of the validation process, the results of field and laboratory QA/QC samples were evaluated along with the raw data generated by the laboratory.

With few exceptions, the data collected during the Phase II groundwater evaluation met the data quality objectives (DQOs) specified in the RDWP. The few data that did not meet DQOs were rejected. Other quality control issues identified during the data validation process are noted in the data summary tables. A summary of the qualifiers used in reporting the data is provided in Appendix F.

8. PRIVATE WELL SAMPLING

8.1 Overview

As part of the Phase II groundwater evaluation, water samples were obtained from nine private wells (residential and commercial facilities). For sampling purposes, the water treatment system at each location was by-passed. Taps were turned on and water was allowed to discharge for approximately one minute to flush the system. Thereafter, a sample of water was obtained and submitted to the analytical laboratory for total and dissolved lead and cadmium analysis. The locations from which tap water samples were obtained are identified on Table 8-1 along with the results of chemical analyses of the samples.

8.2 Results

The results indicate that the Safe Drinking Water Act level for total lead (i.e., 15 µg/L) was exceeded in three samples. In four samples, the RAO for total lead (i.e., 10 µg/L) was exceeded. No MCLs or RAOs for cadmium were exceeded. In the samples obtained from the taps located at the Cassano, Cruz and Eyler residences, respectively, the RAO for total lead. The Safe Drinking Water Act level was exceeded in the samples obtained only from the Cruz and Eyler residences.

The greatest concentration of total lead detected was 26.5 ppb, which was detected in the sample obtained from the Eyler residence in July 1998. It was suspected that this detection was related to the piping at the Eyler residence. To bypass the treatment system, the plumbing had to be physically disconnected. To purge the system, water was allowed to discharge for approximately one minute, however, it was discharged very slowly and a complete purge of the plumbing may not have been achieved. A sample of water was obtained directly from the disconnected piping. To evaluate the effect that purging the plumbing had on the sample, the water from this location was resampled in January 1999. In the latter sampling event, a better purge was achieved. The results of the second round of sampling at the Eyler residence indicated that the sample contained a total lead at concentration of only 10.5 ppb.

Including the results of the second round of sampling at the Eyler residence, the RAO for total lead was exceeded at three locations. Cadmium was not detected in any of the samples. Aliquots of each sample were also filtered in the field prior to chemical analysis to evaluate dissolved lead and cadmium concentrations. The results of the analysis of dissolved lead and cadmium are summarized on Table 8-1. Except for the original sample obtained at the Eyler Residence (i.e., July 1998), neither Safe Drinking Water Act levels nor RAOs were exceeded for dissolved lead and cadmium in any of the samples obtained.

8.3 Evaluation of Results

Although lead is a constituent in groundwater at the NL site, it is not the source of the lead detected in the tap water at the private wells. Most of the private wells are not hydraulically downgradient from the site. Therefore, it is improbable that groundwater containing lead at the site could affect the private wells. Also, the groundwater at the site contains cadmium. If groundwater from the site had affected the water from the private wells, then cadmium would have also been detected in the samples. Because cadmium was not detected, the source of lead in the tap water from the private wells is unrelated to the groundwater at the NL site. More likely, the source of lead is related to the plumbing of the water systems at the private wells. The possibility that the plumbing systems are the sources of lead detected at the Cassano, Cruz, and Eyler residences was confirmed through the two sampling events performed at the Eyler residence where the purge of the plumbing systems was varied.

9. AQUIFER TEST

9.1 Overview

In 1983, Geraghty & Miller performed an aquifer test at the NL site. The EPA questioned some of the techniques used in Geraghty & Miller's evaluation and required the Group to perform an aquifer test. This section includes a description of the aquifer test performed in June 1999 by GeoSyntec. The aquifer test was conducted to: (i) confirm the hydraulic parameters determined by Geraghty & Miller in 1983; (ii) predict the performance of a groundwater extraction system that might be designed to remove lead and cadmium from the aquifer; and (iii) establish input parameters for capture zone modeling as requested by the EPA.

Aquifer parameters have been estimated based on the results of the aquifer test completed in June 1999. Standard analytical methods were employed in the analysis of the aquifer test data to determine transmissivity, hydraulic conductivity, and storativity. AQTESOLV™ for Windows™ (HydroSOLVE, Inc., 1999) was used to perform the analyses. The hydraulic parameters, combined with other site-specific data such as average grain size, depth to the underlying clay layer, saturated thickness, etc., were used to refine the conceptual hydrogeologic model of the site originally presented in the *Phase I Groundwater Evaluation Technical Memorandum.*

The aquifer testing included ambient water-level monitoring, a variable-rate pumping test (step test), and a 72-hour constant-rate pumping test. Groundwater was pumped from pumping well PW, a six-inch diameter, fully-penetrating well installed and developed for the conduct of this aquifer test. Drawdown was measured in several nearby wells throughout the testing process, including observation well OW, the nearest well to pumping well PW. The relative locations of PW, OW, and all other observation wells used during the test are presented on Figure 9-1. Boring logs are provided in Appendix A for each of the new wells at the site. The following subsections describe the aquifer testing procedures and present the analysis of the results.

9.2 Procedures

9.2.1 Ambient Water-Level Monitoring

Prior to the on-set of aquifer testing, passive water-level monitoring was conducted using PXD-60 pressure transducers and a Hermit datalogger manufactured by In-Situ, Inc. This monitoring was conducted for approximately 13 days beginning on 20 May 1999 and measurements were collected once per hour. Measurements were obtained from six wells including: PW, OW, 27, 28, KS, and KD. Figure 9-2 shows a hydrograph throughout the 13-day monitoring period at observation well OW. After approximately 95 hours of monitoring, at approximately 12:30 p.m. on 24 May 1999, the water level began to rise in Well OW, increasing approximately one foot over a 13-hour period. This increase in water level was also evident in the other wells monitored. This rise was coincident with an 11-hour precipitation event that included more than two inches of rain over the area (precipitation data derived from Wilmington, Delaware weather station, NOAA, 1999). Following the peak water level, the head in the wells gradually declined toward the seasonal low, approaching static conditions just prior to the step test.

GeoSyntec obtained additional ambient water-level data after the step test and constant-rate test were completed to further evaluate the characteristics of the aquifer. This monitoring began on 23 July 1999 and continued through 9 August 1999. The hydrograph for pumping well PW is shown on Figure 9-3. The graph indicates a steady decline in the water table as no precipitation occurred during the monitoring period. The decline is approximately 0.04 feet per day, with diurnal fluctuations of approximately 0.02 feet. The diurnal peaks generally occur between 3:00 and 4:00 am and the diurnal troughs generally occur between 8:00 and 10:00 p.m. Figure 9-4 shows the first 4,500 minutes of this monitoring period in greater detail.

9.2.2 Step Test

After obtaining the pre-test ambient water-level data, a step test was conducted on 2 June 1999 in pumping PW. This step test was performed to determine an optimal pumping rate for the subsequent constant-rate test by measuring the pumping rate and drawdown and establishing a rate that adequately stressed the aquifer without dewatering the well. A submersible centrifugal pump, powered by a portable 440 amp generator was used. Pumped water was conveyed to a 20,000 gallon portable tank, and the pumping rate was determined with a graduated, five-gallon bucket and a stop watch.

Seven steps were conducted over a period of approximately 200 minutes. Figure 9-5 shows the hydrograph at PW during the step testing and a table of respective pumping rates. Based on the results of the test, a target pumping rate of approximately 20 gallons per minute (gpm) was selected for the constant-rate test. Appendix G contains the raw transducer data from the step test.

9.2.3 Constant-Rate Test

On 7 June 1999, a 72-hour constant-rate pumping test (CRT) was conducted at pumping well PW. Pumping-rate determination, water containerization, and water-level measurement procedures were similar to those used during the step test. In addition, a total of 33 site wells were monitored with portable water-level indicators (WLIs) to calibrate the datalogger and to serve as a backup in the event of datalogger/transducer failure. Appendices H and I contain tabulated data from the datalogger and WLIs, respectively. Prior to the onset of pumping, static water level elevations were determined for each of the wells monitored throughout the aquifer testing (Figure 9-6). The map includes only those wells screened within the upper portion of the unconfined aquifer. Some wells, such as HS and 22 are excluded from the map because they are screened in clay. The water levels measured throughout the testing period are summarized on Table 9-1.

9.3 <u>Evaluation and Results</u>

9.3.1 Hydraulic Analysis

Figure 9-7 shows the hydrograph of observation well OW throughout the testing period. The hydrograph depicts a rapid drop in water level at the start of the constant rate test with minor fluctuations caused by minor adjustments in the pumping rate, followed by steady drawdown over a period of approximately one day. After approximately 1,500 minutes of pumping, the portable generator failed and pumping ceased for 68 minutes until a replacement generator could be brought on-line and the test resumed. Slight fluctuations in the data are evident as the pumping rate was adjusted to original pumping conditions. The maximum fluctuation in pumping rate was 10 percent, and generally, the pumping rate varied by only five percent. Variations occurred only over short periods during the test; therefore, the resultant data are valid for the hydraulic evaluation. The average pumping rate throughout the entire 72-hour period was 18.75 gpm.

Figure 9-8 is the same hydrograph shown on Figure 9-7, but it is extended to show the aquifer recovery following the CRT and includes barometric pressure data collected during the same period. Barometric pressure is monitored during pumping tests to determine the influence, if any, of fluctuating atmospheric pressure on the potentiometric surface in the aquifer. Such an effect is primarily observed in confined aquifers, but prudent practice dictates the monitoring of barometric pressure during all aquifer tests. If an effect is seen, the barometric efficiency of the well is calculated and the drawdown data are adjusted accordingly. For this test, a barometric pressure transducer was connected to the datalogger to record pressure in feet. As shown on Figure 9-8, and as expected for an unconfined aquifer, there was no observed barometric effect on the water table and adjustments were not necessary. The small peak in the recovery data at approximately 11,000 minutes after the start of the CRT resulted when water containerized during the test was released. Figure 9-9 depicts the potentiometric surface on 10 June 1999 near the end of the pumping test.

The drawdown data indicate a delayed-yield response typical of unconfined aquifers. Figure 9-10 shows one example of this response. In Segment 1 of Figure 9-10, the data initially reveal a drawdown curve similar to that expected from a confined aquifer, because water is being released from the elastic storage of the aquifer, not from the pore spaces of the aquifer. Thereafter, in Segment 2, the drawdown rate decreases and the data reveal a more gradual curve as gravity drainage contributes water that was previously held in storage (i.e., within the pore spaces of the sand grains). Eventually, as in Segment 3, the effects of gravity drainage are diminished as the aquifer becomes unsaturated above the cone of depression. Neuman (1974) devised an analytical solution for unconfined aquifers with delayed gravity response. Use of this solution provides estimates of transmissivity, storage coefficient, specific yield, and Beta, a term that relates the aquifer anisotropy and radial distance to the observation well.

Figures 9-11, 9-12, and 9-13 are AQTESOLV™ for Windows™ results of Neuman solutions conducted on drawdown and recovery data from Wells OW, KD, and 28, respectively. Because AQTESOLV™ incorporates the principle of superposition in the analysis to accommodate variable pumping rates (Streltsova, 1988), it is possible to combine both drawdown and recovery (including the short stoppage in pumping when the generator failed) at a well in one solution. Prior to analysis, late drawdown data were corrected for dewatering using Jacob's correction method (Jacob, 1944). The results of the analyses shown on Figures 9-11, 9-12, and 9-13 are summarized below.

Well	T (gpd/ft)	S	Sy	B	b (ft)	k (gpd/ft^2)
OW	3800	5.03E-04	4.69E-02	4.30E-03	23	165
28	4200	1.60E-03	2.29E-02	2.70E-01	18	233
KD	4300	2.40E-04	1.00E-02	1.33E-02	23	187
Mean	*4100*	*7.81E-04*	*2.66E-02*	*9.59E-02*	*21*	*195*

Notes: T = Transmissivity
S = Storativity
Sy = Specific yield
B = Beta
b = Aquifer thickness
k = Hydraulic conductivity

The results indicate a relatively transmissive aquifer, with: (i) an average transmissivity of approximately 4,100 gpd/ft; (ii) a storativity of 8 x 10^{-4} during the earliest portion of the data, a result that is reasonable for the segment of the test that exhibits a confined aquifer response; and (iii) a specific yield (equivalent to storativity near the end of the test) of approximately 3 x 10^{-2}, a result that is a reasonable storativity estimate for an unconfined aquifer. At an average saturated thickness of 21 feet, these results yield a hydraulic conductivity estimate of approximately 195 gpd/ft^2 or 26 ft/day. These results are similar to the results obtained previously by Geraghty & Miller.

9.3.2 Chemical Analysis

Throughout the CRT, pH and turbidity were monitored. These results are presented on Table 9-2. In addition, groundwater samples were obtained from the pumping well and analyzed for lead, cadmium, VOCs and general chemical parameters. The results of the chemical analyses of groundwater samples obtained from pumping well PW during the CRT are summarized on Tables 9-3 through 9-5. Trace concentrations of VOCs were detected. The data for lead, cadmium, pH, and turbidity were plotted with time on Figures 9-14 through 9-17. As indicated on Figures 9-14 through 9-17, the concentrations of lead and cadmium in the extracted groundwater were low, relative to the ambient concentrations of lead and cadmium in the groundwater where the extraction well is located. More significantly, the concentrations of lead and cadmium declined during the test. For lead, the concentration was below the level of detection during most of the test. On one occasion, the generator supplying power to the pump stopped. Upon restarting the generator and pump, an increase in turbidity and lead concentration occurred briefly. Thereafter, the flow rate of the pump was altered slightly several times, which also resulted in minor variations in turbidity and lead concentrations (Figures 9-14 and 9-15).

For cadmium, a steady decline in concentration was noted during the aquifer test. It is anticipated that the concentration of cadmium could have declined to below the level of detection within 12 to 15 days of pumping. However, because the test was performed for only three days, the time required for the concentration of cadmium to decline to the detection level is estimated.

9.3.3 Anticipated Extraction of Lead and Cadmium

When groundwater is extracted for an extended period, the concentrations of any constituents either dissolved in groundwater or entrained in the flow of groundwater tend to asymptotically decline to a minimum as geochemical reactions and dilution occur. In this case, the level to which the concentration of lead is expected to decline is below the level of detection. It is also anticipated that for cadmium, the concentration will be at or below the detection level. Under a long-term pumping scenario, the concentration of inorganics such as lead and cadmium in extracted groundwater may be significantly lower than the respective detection levels.

Assuming that 1 ppb of lead could be extracted continuously at an estimated flow rate of 37 gpm (Section 10) it is estimated that approximately 60 years of pumping would be required to extract a significant amount of the lead remaining in groundwater (Table 9-6). For cadmium, assuming the same extraction rate and an average concentration of 2 ppb in the extracted groundwater, it is estimated that 50 years of pumping would be required to extract a significant mass of the cadmium remaining in groundwater (Table 9-6). These timeframes are theoretical. Achievement of RAOs may occur in shorter periods as a result of the naturally occurring improvement of groundwater quality described above. Therefore, it is expected that extracting small amounts of lead and cadmium through the use of the pump-and-treat technique will not significantly enhance improvement of groundwater quality.

As described in Section 12, the results of modeling confirm that extracting significant amounts of lead and cadmium from the aquifer is infeasible. In fact, extracting lead and cadmium by pumping groundwater is so ineffective that it will not contribute significantly to achievement of RAOs. Therefore, the implementation of a pump-and-treat remedy for this site is impractical.

10. CAPTURE ZONE MODELING

10.1 Overview

This section describes the methods that GeoSyntec used to perform a capture zone analysis for groundwater at the NL site. The capture zone analysis was required by the EPA as part of the upcoming design of a remedy for groundwater. Specifically, the capture zone analysis was conducted to determine the optimum placement and pumping rates of simulated extraction wells to "capture" groundwater particles that migrate from the zone of impact.

The capture zone analysis was performed using numerical computer modeling techniques. A commercial computer code was selected and a model was constructed using site-specific aquifer data. Groundwater flow was then simulated within the model using the computer code. The model was calibrated by comparing known groundwater hydraulic heads to computer-simulated heads, and adjusting the model construction until observed heads and simulated heads were in agreement. After the model was calibrated, pumping conditions were imposed on the simulated aquifer and the model was verified.

Verification involved simulating the conditions of the constant-rate aquifer test described in Section 9 and comparing the simulated results to the results observed during the pumping test. After the calibrated model was verified, hypothetical groundwater particles were introduced in the model to track the pathlines of simulated advective groundwater flow. These pathlines represent the track of particles of groundwater that would be extracted or "captured" by a pumping well. Note that, the capture zone model does not address the possibility of extracting any constituents along with the groundwater particles. Therefore, the results of the capture zone evaluation alone cannot be used to evaluate the possible effectiveness of a pump-and-treat system at removing contaminant mass from the aquifer. Instead, an evaluation of fate and transport, as described in Section 12, is necessary.

The remainder of this section presents the methods and procedures used to construct and calibrate the capture zone model using MODFLOW (McDonald & Harbaugh, 1983). This section also contains the results of the capture-zone determination for one groundwater extraction scenario.

10.2 Groundwater Flow Model

10.2.1 Model Development

Site-specific hydrogeological data have been reported in several previous reports (e.g., Geraghty & Miller, 1983, O'Brien & Gere, 1990, GeoSyntec Consultants, 1998, and GeoSyntec Consultants, 1999). The site model was designed to include the existing data. This approach resulted in a model that adequately represents hydrogeologic conditions at the site. As discussed in the document entitled, "Capture Zone Evaluation Plan" [GeoSyntec, 1999], the uppermost portion of the unconfined aquifer is the principal area of impact beneath the site (Figure 7-11) and was, therefore, simulated in the site model. At the request of the EPA, this portion of the aquifer was divided in the model into two layers to allow MODFLOW to simulate vertical flow near pumping wells.

10.2.2 Model Grid

A base map showing model orientation, grid spacing, and inactive cells is shown on Figure 10-1. The focus area of the model was the area of former operations at the site and in most cases, did not extend beyond the property boundaries. Gray cells beyond the limits of this area depict inactive cells in the model. The model grid contains 39 rows and 37 columns in each layer. A variable grid spacing was used to allow smaller cell sizes near the pumping well (where head changes between adjacent cells are more pronounced) and larger cell sizes away from the pumping center (where such head changes are minimal). The top elevation of Layer 1 (i.e., ground surface) was taken from the site base map (OHM Remediation Services Corporation, 1996) and the bottom elevation of Layer 2 (i.e., the top of the underlying clay) was taken from site well logs and accompanying survey data. The bottom of Layer 1/top of Layer 2 was set at the midpoint between ground surface and the top of the underlying clay.

10.2.3 Aquifer Parameters

The aquifer parameters were taken from previously-obtained site-specific data. Based on the aquifer test results described in the Capture Zone Evaluation Plan and Section 9 of this report, hydraulic conductivity was set at 26 ft/day, specific storage (Ss) was set at 0.002, and specific yield (Sy) was set at 0.02. Effective and total porosity were set at 0.2 and 0.4, respectively. With the exception of recharge and evapotranspiration, each hydrologic parameter was established as a constant in the model. Recharge and evapotranspiration were set at 10 and 26 in/yr, respectively, throughout the model (in Layer 1) except at the location of the concrete pad where these parameters were significantly less.

Based on reasonable estimates for aquifers in this setting, aquifer recharge between 10 and 14 inches per year was deemed appropriate for use in the model. To further estimate the recharge value for the model, the EPA's HELP3 model was utilized. Default input values for nearby Wilmington, Delaware and site-specific values for soil type and vegetative cover indicated that of the average annual precipitation of 40.71 inches expected to fall over a 30-year period, 26.13 inches would be evapotranspired and 1.14 inches would run off, leaving roughly 13 inches to enter the water table. Considering the rapid, one-foot water-level rise observed following a heavy rain (Figure 9-2), this appears to be a reasonable estimate.

10.2.4 Boundary Conditions

The approach to establishing model boundary conditions was to focus the model specifically within the site boundaries, where hydraulic data are readily available, yet fit the model within the regional flow system. The types of boundary conditions used in the model included general head, no-flow, and wells. As mentioned previously, the area surrounding the property was modeled with no-flow cells (cells inactive for flow). General-head boundaries were established in two main areas: (i) west and northwest of the site to simulate the effects of the Delaware River, the regional receiving stream; and (ii) south, east and northeast to simulate the groundwater high southeast of the site and establish the hydraulic gradient observed at the site. The general heads were varied throughout the calibration process to achieve the best representation of observed heads and gradient at the site. This approach was used because there are generally insufficient hydraulic data from the area outside the property boundaries. The well boundary (i.e., the pumping well used for the pumping test) was activated only for the pumping scenarios in the model simulations.

10.2.5 Non-Pumping Simulation

Following setup, the model was run in steady-state to simulate aquifer conditions under a non-pumping scenario. Initial heads for the model were based on the static water levels observed prior to the start of the aquifer test on 7 June 1999 (see Figure 9-6). Figure 10-2 depicts the Visual MODFLOW output of a steady state simulation. The resultant head elevations, flow directions, and gradients represent the observed data presented on Figure 9-6. Figure 10-3 shows the calibration statistics and a plot of simulated versus observed heads for the 13 wells depicted as shaded cells on Table 9-1. These wells comprise the set of site wells for which confident survey data are available and which are screened within the shallow portion of the unconfined aquifer. Well 29 was omitted from the calibration statistics because its water level could not be adequately simulated by the model. This situation may be attributed to hydrogeologic conditions that exist beneath the concrete pad, which will be removed as part of the remedial action for soil and sediment.

10.2.6 Simulation

Following calibration of the steady-state model, simulated pumping conditions were imposed to verify the calibrated model. A pumping well was simulated at the location of PW-1, which was the test well installed for the aquifer test. The simulated well had a pumping rate of 18.75 gallons per minute (gpm) and a pumping duration of three days. These conditions are identical to those of the aquifer test conducted on 7 June 1999. A transient groundwater flow simulation was conducted to simulate the aquifer test. Figure 10-4 shows the MODFLOW-simulated water table at the end of the constant-rate aquifer test. As shown by the observed data from the end of the aquifer test (Figure 9-10), the model provides is a very good simulation. Figure 10-5 shows calibration statistics and a plot of simulated versus observed heads for the pumping simulation. Observation wells used for calibration were identical to those used for the static condition.

10.2.7 Capture-Zone Simulations

Upon verification of the calibrated model, a capture zone was simulated for pumping well PW-1. A series of groundwater particles were simulated around the well to track advective groundwater flow in each of the two model layers. The analytical exercise of tracking groundwater particles simulates the movement of groundwater particles as they travel along the hypothetical flow lines established by the pumping well. Tracking groundwater particles for a given time period shows the path that the groundwater may take to arrive at the pumping well during the time period modeled.

Figure 10-6 shows the pathlines of groundwater particles at a time of five years after the start of pumping for a four-extraction-well scenario, where extraction wells are located near PW, OS, 11, and JS. For the scenario depicted on Figure 10-6, capture of groundwater from the impacted area of the site was achieved with a combined total groundwater extraction rate of 37 gpm (i.e., 12 gpm at PW, 10 gpm near OS, 7.5 gpm near 11, and 7.5 gpm near JS). For the capture zone analysis, the effects of the concrete pad (i.e., reduced recharge and evapotranspiration) were removed from the model because the concrete pad will be removed during the remedial action for soil and sediment. Within each of the individual capture zones on Figure 10-6 are arcuate patterns formed by small arrows aligned in the direction of groundwater flow. These arrows represent one-year travel times (i.e., a particle of groundwater at the arrows will take one year to reach the pumping well). The five-year simulation in Figure 10-6 shows that well PW will capture the majority of the water within the area of lead and cadmium impact in less than one year. This is demonstrated by the one-year travel time zone (represented by the first arc) which extends out near Wells IS and ID and the eastern property boundary.

11. GEOCHEMICAL EVALUATION

11.1 Overview

This section contains descriptions of some of the prominent geochemical features that affect the concentrations of constituents in groundwater. The geochemical evaluation was performed to address issues raised by the EPA regarding the capacity of the aquifer at the NL site to assimilate constituents in groundwater and the permanence of the geochemical reactions that have resulted in reductions in mass of lead and cadmium in groundwater.

The battery acid released locally into the soil when the site was in operation carried with it many of the constituents that have been detected in groundwater. The acid reacted with soil and groundwater. Naturally occurring geochemical reactions buffered the acid and some of the entrained constituents (i.e., inorganic) were sorbed into the aquifer material and were permanently removed from groundwater. Other constituents formed insoluble compounds or complexes and precipitated from solution. These reactions are documented in the literature [Kinniburgh, et al, 1976; Bodek, 1988, Evans, 1989, Smith, et al, 1995; etc.]. The remaining constituents that did not either precipitate or sorb are potentially present in groundwater. As stated in the Phase I Memorandum, the dominant geochemical reactions that occurred among the inorganic constituents were sorption and precipitation reactions, which reduced constituent solubility and resulted in a decrease in the mass of constituents in groundwater. The analyses performed to evaluate the reactions are discussed further below.

11.2 Analyses

Soil samples obtained from three locations were submitted to an analytical laboratory for geochemical analyses. The samples were obtained during the installation of monitoring wells 26, 28 and 29. A duplicate soil sample prepared from the soil obtained from monitoring well 28 was also analyzed. Each soil sample was obtained from within the water column and as near to the water table as possible. The analyses performed on the samples included: (i) thin-section petrography to identify iron and manganese coatings in soil; (ii) x-ray diffraction to evaluate the presence of lead-bearing materials in the coatings; and (iii) sequential extraction of lead and cadmium using progressively more aggressive extraction solutions to evaluate the permanence of the reactions between lead or cadmium and aquifer soils.

The results of the thin section petrography analyses performed by Core Laboratories (Core Lab) of Carrollton, Texas are presented in Appendix C. The results indicated the presence of iron and manganese oxide/hydroxide coatings in soil (Appendix C). As stated in *Phase I Groundwater Evaluation Technical Memorandum* and in the literature [Kinniburgh, et al, 1976; Yong, et al, 1993], these coatings are strong adsorption sites for inorganic constituents such as lead and cadmium.

To preliminarily evaluate the possible presence of inorganic constituents in the coatings, Core Lab performed x-ray diffraction analysis on the samples to observe lead as an indicator parameter (Table 11-1). The results of the x-ray diffraction analyses indicated that lead phosphate was possibly present in the some of the coatings at trace concentrations (i.e. less than five percent); however, the analytical technique was not sufficiently sensitive to confirm the presence of lead phosphate in the coatings at the trace concentrations observed.

To further evaluate the possible presence of inorganic constituents (i.e., lead and cadmium) in the iron and manganese oxide/hydroxide coatings and other aquifer materials, Toxscan, Inc., of Watsonville, California performed speciation analyses, using lead as an indicator parameter, and sequential-extraction analyses for both lead and cadmium on the soil samples. The speciation analyses were performed to identify the types of compounds and complexes in which lead, as the indicator, was associated. The sequential extractions were performed using progressively more aggressive extraction fluids to strip lead and cadmium from the various aquifer materials. After each extraction event, the extraction fluid was analyzed for the presence of lead and cadmium. The results (Table 11-2) indicated that a very aggressive extract fluid was needed to dissolve the iron and manganese hydroxide coatings and release lead and cadmium into the extraction fluid (see Appendix D for detailed laboratory report).

The results of these analyses indicate that iron and manganese oxide/hydroxide coatings are present in the soil at the site and that when the coatings are dissolved in acid, the lead and cadmium that was adsorbed in the coatings are released (Table 11-2). According to the results of the analyses performed in this project, an aggressive extraction fluid having a pH of less than 2 was needed to effectively dissolve the iron and manganese hydroxide coatings in the soil samples and thus to release lead and cadmium from the coatings. These results are consistent with findings presented by other researchers where significant amounts of lead remained bound to coatings in soil even when exposed to extraction fluids having pH values as low as 1.5 [Chaney, et al, 1985; Yong, et al, 1993].

11.3 General Geochemical Parameters

Aquifer materials are effective in removing lead and cadmium from groundwater. Results from analyses of inorganic constituent concentrations and general water quality parameters (Tables 11-2 and 11-3) in groundwater samples obtained from locations within the zone of impact were compared with results from analyses of total metals concentrations associated with aquifer material (i.e., soil). These results indicate that groundwater samples from monitoring wells 26, 28 and 29 contained dissolved lead concentrations ranging from 1.4 to 49.2 ug/L, dissolved cadmium concentrations ranging from 0.76 to 41.6 ug/L and pH values ranging from 2.9 to 5. As shown on Table 11-2, soil samples from these wells contained total lead concentrations ranging from 1.9 to 4.1 mg/Kg, cadmium concentrations less than 0.1 mg/Kg and pH values ranging from 6.0 to 7.3. The constituent concentrations measured in the aquifer material are within the range of typical background values for these constituents (i.e. lead and cadmium concentrations of 10 to 67 mg/Kg and 0.1 to 3 mg/Kg, respectively; Pais and Jones, 1997).

Groundwater data from the site indicate that inorganic concentrations in groundwater decrease as pH values increase with distance from the center of the zone of impact. This results from decreases in inorganic concentrations that result from precipitation and/or sorption to the aquifer material, which increases as pH increases. Aquifer materials in contact with groundwater in monitoring wells 26, 28 and 29 do not appear to be significantly affected by the constituents in groundwater, because the concentrations of lead and cadmium in groundwater (i.e. ppb range) relative to naturally-occurring concentrations of these constituents in soil (i.e., ppm range) are sufficiently low that sorption and/or precipitation of lead and cadmium may be masked by the natural lead and cadmium content of soil. At the same time, the aquifer materials appear to be effective at removing lead and cadmium from groundwater through these sorption and precipitation mechanisms, as evidenced by the continually decreasing concentrations of lead and cadmium within the shrinking zone of impact (i.e., decreasing mass).

11.4 Permanence of Geochemical Reactions

The aquifer material is a sink for lead and cadmium and the sorbed inorganics are resistant to leaching. This relationship is commonly described in the literature [EPA, 1991; Kinniburgh, et al, 1976; Yong, et al, 1993; Evans, 1989; Smith, et al, 1995; changes et al, 1995, etc.]. Furthermore, this relationship was demonstrated by the results from sequential extraction analysis for lead and cadmium in the aquifer materials, which was performed to assess the association of lead with particular phases of the aquifer material (Table 11-2) The sequential extraction analysis uses extraction solutions of increasing strength to strip the lead associated with the exchangeable, carbonate, iron-manganese oxide/hydroxide, organic and residual phases, respectively. The results indicated that the lead in each sample was predominantly (84 to 92 percent of the detectable lead) associated with the residual phase of the aquifer material, which could include lead oxides, phosphates, and sulfides. The lead in this residual phase is very resistant to leaching by low pH (< 2) solutions, as evidenced by the fact that this phase is the last lead phase addressed in the sequential extraction analysis and this phase requires the strongest acidic stripping solution. This is consistent with the findings of other research presented in the literature.

Results also indicated that the remaining lead (8 to 16 percent of detectable lead) in the aquifer materials was associated with carbonate and iron and manganese oxide/hydroxide phases (also consistent with the literature). The lead associated with carbonate phases likely represents lead that has precipitated through the formation of lead carbonate solids, whereas the lead associated with iron and manganese oxide/hydroxide phases represents lead that has sorbed to reactive surface sites on these materials or coprecipitated with the iron and inorganic oxide/hydroxide phases. The lead in these phases is resistant to leaching by groundwater, and required acidic stripping solutions to remove the lead associated with both phases. Additionally, the neutralizing capacity of the aquifer material reduces the potential for these phases to be leached by low pH groundwater.

11.5 Soil Sorption Capacity

The aquifer material has a significant capacity for the immobilization of lead and cadmium by adsorption. For example, the capacity of aquifer material to immobilize lead can be estimated using the following relationship (Zimdahl and Skogerboe, 1977):

Capacity of soil to sorb lead (mol/g) = (2.81E-6)(CEC) + (1.07E-5)(pH) – 4.93E-5

where CEC = cation exchange capacity in meq/100g of soil, and pH = pH of soil.

Using a mean pH value of 6.5 for aquifer material and a mean CEC of 1.71 meq/100g (Table 11-3), the capacity of the aquifer to sorb lead is approximately 2.51E-5 mol/g, (5,190 mg/Kg). Therefore, lead can be permanently sorbed to soil up to a soil-lead concentration of 5,000 ppm without significant future desorption. If all of the lead in the groundwater at the site were sorbed into the aquifer material, the resultant increase in the concentration of lead in soil would be one or two ppm (Table 2-1) and the final concentration of lead on the soil after sorption would be in the range of background concentrations (i.e., 10 to 67 ppm). Furthermore, because the concentration of lead in groundwater relative to the soil's sorption capacity is very small, the capacity of the aquifer material at the site to sorb lead will never be exceeded. A similar relationship is true for cadmium. This relationship helps to explain why the zone of impact at the site is stationary and why concentrations of lead and cadmium have decreased without any active remediation being performed (i.e., mass in groundwater is decreasing).

12. FATE AND TRANSPORT MODELING

12.1 Overview

This section describes limited fate and transport modeling performed using the flow model described in Section 10. Visual MODFLOW's link to MT3DMS, the fate and transport model developed by the University of Alabama, was utilized for the simulations. This section describes the methods used to conduct simple transport simulations at the site, and also includes results and conclusions of the simulations.

Although the simulations were not performed to conclusively demonstrate environmental fate and transport of site contaminants through rigorous geochemical modeling, the simulations demonstrate that pH is an important factor related to declining lead and cadmium concentrations at the site. The modeling also provided additional evidence that lead and cadmium cannot effectively be extracted from the aquifer by pumping groundwater.

12.2 Transport Simulations

The flow model described in Section 10 was used as the base model upon which fate and transport simulations were performed. Input parameters for the flow model were previously described. Input parameters for MT3DMS included a longitudinal dispersion coefficient of 10 ft. MT3DMS establishes a default horizontal dispersion value equal to $^{1}/_{10}$ the value of longitudinal dispersion, or 1 ft. Bulk density was set at 75.3 kg/ft^3 and sorption was simulated with a linear isotherm. Kinetic reactions were not simulated. Starting concentration data were derived from the early sampling results obtained at the site. For lead, this data set was the 1983 data. Cadmium starting concentrations in the model were based on the 1989 sampling results.

Recognizing the relationship between pH and distribution coefficient (Kd), Kd values in the model varied with pH and were established using the algorithms presented in Volume 2 of EPA's recent report on Kd (EPA, 1999). Specifically, Kd zones in the lead and cadmium transport simulations were established using the following relationships, which are presented in Appendix F and Appendix C of Volume 2 of the Kd report for lead and cadmium, respectively:

$$Kd_{lead}\ (ml/g) = 1639 - 902.4(pH) + 150.4(pH)^2$$

$$Kd_{cadmium}\ (ml/g) = -0.54 + 0.45(pH)$$

Two simulations were performed for each of the two parameters of concern for the model, lead and cadmium. For lead, the first simulation was from 1983 to 1989. For cadmium, the first simulation started at the beginning of 1989 and terminated at the end of 1989 to synchronize the subsequent simulations that ran from 1989 to 1998 for both lead and cadmium. pH values for inclusion in the above algorithms were based on measured pH during the 1983 and 1997 sampling events. These two data sets were chosen for their completeness.

The results of the simulations that ended in 1989 were scaled to account for the established relationship between pH and measured concentrations of lead and cadmium (i.e., as pH rises, lead and cadmium concentrations decrease). The scaling factor was determined using the following relationship:

$$C_{1997-1998} = C_{1983}(\log^{pH}{}_{1983}/\log^{pH}{}_{1997})$$

This relationship recognizes that pH change is logarithmic, and provides a simple way to account for declining concentrations at the site as a result of changes in pH.

12.3 Results

Figures 12-1 and 12-2 show the simulated lead and cadmium concentrations, respectively, in 1989 at the conclusion of the first simulation. The results show very little change in the distribution and magnitude of lead and cadmium concentrations from their initial values. Simulated transport from 1989 to 1998 using the scaled concentrations results in the diagrams provided as Figures 12-3 (lead) and 12-4 (cadmium). With minor variations in distribution, concentrations significantly declined, which is consistent with what has been observed in the data. The following summary for monitoring well SD (as an example) demonstrates the decrease in the concentrations of lead and cadmium in the area of the site that has consistently exhibited the highest concentrations.

WELL SD:

Pb $1983_{measured}$	2960 ug/L
Pb $1998_{simulated}$	251 ug/L
Pb $1998_{measured}$	25 ug/L
Cd $1989_{measured}$	963
Cd $1998_{simulated}$	104
Cd $1998_{measured}$	184

The effect of pH on the sorption and precipitation of lead and cadmium accounts for much of the observed decline in concentrations of these inorganics. For lead concentrations at monitoring well SD, the pH relationship underestimates the decline in concentrations. For cadmium, the pH relationship slightly overestimates the observed decline at monitoring well SD. Overall, however, increasing pH is shown to be an important factor in the reduction of mass of lead and cadmium in groundwater. The variation between simulated concentrations and measured concentrations is caused by simplifying assumptions used in the model that do not exactly match the geochemical processes that occur at the site.

The model predicts that lead and cadmium are not significantly transported, as shown by the lack of change in the distribution of lead and cadmium in the MT3DMS model, which is consistent with observed trends. Instead, lead and cadmium are sorbing to the unconsolidated sediments in the shallow unconfined aquifer and are thereby rendered immobile. This occurrence is further shown in Figure 12-5, which represents a simulated pump-and-treat scenario. Cadmium was modeled in the scenario, because it is the more soluble and mobile of the two parameters.

Simulated pumping of the simulated extraction well near the location of PW, in the center of the largest observed concentrations at the site, from 1989 to 1998, had no observable effect on either the concentration or distribution of cadmium. Because simulated pumping did not affect cadmium at a time when concentrations were higher and pH lower, there was no need to simulate a future pumping scenario wherein pH becomes progressively higher and constituent mobility further decreases. Because pumping has no significant effect on constituent concentrations, the improvement in groundwater quality that has been observed would be expected to continue at approximately the same rate whether or not a pump-and-treat remedy is implemented.

These results support the conclusion that cadmium (and lead) are immobile and cannot be significantly recovered by pumping and treating.

13. GROUNDWATER RISK CONSIDERATIONS

13.1 Overview

A risk assessment was performed for the site and presented in the RI. A review of the results of the risk assessment indicated that on-site conditions that existed at the time the risk assessment was performed posed risk, but off-site risks were expected only under a future use scenario. In the risk assessment, it was assumed that constituents observed on-site would migrate off-site at relatively high concentrations. This assumption was described in the risk assessment as unrealistic as it was further stated that natural processes such as adsorption, degradation, volatilization and/or dilution would decrease constituent concentrations below the concentrations used to calculate risks. Based on a description of the methods used to calculate possible risks related to groundwater, it was observed that the concentrations of the constituents considered were based on site conditions that prevailed at the time the risk assessment was performed and the unrealistic assumptions regarding future off-site constituent concentrations. Since the risk assessment was prepared and after 16 years of monitoring groundwater quality, it has become clear that not only has groundwater quality improved significantly, but also that the constituents have not migrated to areas where off-site exposure could occur (Figures 7-6 through 7-16). Therefore, the potential risks presented in the RI overstated actual risks then, and actual risks are overstated more so, now. As described below, recognition of this overstatement of risk has contributed, in part, to the conclusion that a pump-and-treat remedy for groundwater is unwarranted at the NL site.

13.2 Actual Risk Potential

In the risk assessment it is stated that the VOCs 1,1-dichloroethene and vinyl chloride and the inorganics arsenic and beryllium in specific locations dominantly caused the estimation of significant potential risks related to groundwater. It is also stated that the inorganics in groundwater can be expected to be adsorbed to subsurface soil and not be significantly transported site-wide or off-site. However, the risk calculations did not adequately address this fact. Although, it was stated in the risk assessment that the potential for exposure through the groundwater pathway was overestimated.

Through 16 years of monitoring, data have been obtained that verify that inorganics are not transported significantly site-wide or off-site. Also, the frequency of detection of the VOCs and the concentrations of the VOCs have declined significantly through the monitoring period (Section 7). Therefore, the quality of on-site and off-site groundwater measured in 1998 is far better than it was estimated to be in the risk assessment.

The pump-and-treat remedy required by the ROD was predicated on groundwater quality observed in the 1980's. The recently measured zone of impact does not significantly extend to off-site areas (i.e. either the constituent concentrations are below MCLs or safe drinking water standards, or the area affected is very small and in fact too small for any reasonable risk of exposure). Therefore, no routes of exposure or potential receptors exist off-site. On-site, where constituent concentrations exceed RAOs, institutional controls can be implemented to prevent any possible exposure to constituents in groundwater. Therefore, from an exposure potential viewpoint, with institutional controls, there are no current or future risks related to groundwater.

13.3 Need for Remediation

Because human exposure to groundwater constituents can be prevented, there are no current or future risks. Where there are no current or future risks, there is no need to remediate groundwater. Furthermore, where there are no current or future risks, there is no need to hydraulically control groundwater flow. That is, it is not necessary to extract groundwater to control groundwater flow direction, because groundwater is not significantly transporting constituents. It was also found in this evaluation that lead and cadmium cannot be recovered from the subsurface by extracting groundwater. Therefore, it is clear that the pump-and-treat remedy is not needed to address risks, and if implemented, will fail to be effective.

14. CONCLUSIONS

14.1 Overview

The results of the analyses performed for groundwater provide substantial evidence that a pump-and-treat remedy is not only unwarranted at the NL site, but also is incapable of remediating groundwater at the site. Furthermore, it is unnecessary as a tool for the control of constituent migration through hydraulic manipulation of the water table because constituents are not migrating. Also, the evidence shows that natural geochemical factors are effectively resulting in improvement of groundwater quality without any human intervention. Because the zone of impact is not migrating and because the concentrations of constituents in groundwater are decreasing, constituent mass in groundwater is also decreasing. Current groundwater conditions are improved over conditions that prevailed in the past, and groundwater quality is expected to continue to improve in the future. The conclusions made from the results of the Phase II groundwater evaluation are presented below.

14.2 Project Background and Historic Data

- The former release of battery acid is the primary cause for the historic zone of impact in groundwater.
- After monitoring groundwater quality periodically for 16 years it is clear that the mass of constituents in groundwater is decreasing and that groundwater quality is improving.
- This improvement occurred naturally.

14.3 Former Septic Bed Evaluation

- The former septic bed is not a significant source of constituents in groundwater.

14.4 Groundwater and Soil Samples

- The results of the analysis of groundwater samples confirm that the zone of impact is stationary and shrinking (i.e., constituent mass in groundwater is decreasing).
- Constituents are not migrating significantly either on or off the site.
- Constituents in groundwater at the NL site are not the cause of lead detected in samples obtained from private wells.
- Lead and cadmium are currently the only constituents in groundwater that warrant further consideration relative to the possible implementation of a remedy.

14.5 Aquifer Test

- The hydraulic parameters defined by GeoSyntec and Geraghty & Miller are in general agreement. Therefore, aquifer hydraulic parameters are reasonably well defined.
- The results of chemical evaluations performed during the aquifer test provide evidence that lead and cadmium cannot be significantly removed from the aquifer.

14.6 Capture Zone Evaluation

- Four extraction wells operating at a combined flow rate of approximately 37 gpm would be sufficient to extract groundwater from the areas of the site containing groundwater impacts.
- The results of the capture zone evaluation address the extraction of groundwater only, and do not address the feasibility of removing lead and cadmium from the aquifer.

14.7 Geochemical Evaluation

- Naturally occurring geochemical reactions have resulted in significant improvement of groundwater quality.
- Coatings on soil particles, such as iron and manganese oxide/hydroxide coatings which are significant adsorption sites, were confirmed to be present at the site.
- The capacity of the aquifer to assimilate constituents in groundwater is sufficient to accommodate far greater amounts of constituents than are present in groundwater.
- The mass transfer of lead and cadmium from groundwater to aquifer material is desirable and permanent.
- The inability to extract lead and cadmium from the subsurface, as observed during the aquifer test, is explained by the strong tendency for the parameters to sorb to coatings in soil.

14.8 Fate and Transport Modeling

- The limited fate and transport evaluation supported statements made herein and in the Phase I Memorandum regarding the immobility of constituents.
- By scaling lead and cadmium concentrations based on measured pH improvement, the evaluation reasonably accounted for the observed naturally-occurring improvement in groundwater quality that has occurred since 1983.
- The results of the limited modeling supported the conclusion that the extraction of lead and cadmium from the aquifer by pumping groundwater is not feasible.

14.9 Groundwater Risk Considerations

- No off-site risks currently exist or will exist in the future, because there is no pathway between on-site constituents and any possible off-site receptors.

- Any possible exposure to constituents in groundwater can be prevented through the use of institutional controls.

- Based on a lack of risks, no remediation (other than institutional controls and monitoring) is necessary to address risks. Specifically, it is unnecessary to attempt to remove lead and cadmium from the subsurface because they are being effectively and permanently sorbed onto soil. Also, extracting groundwater for hydraulic control of lead and cadmium migration is not needed because lead and cadmium are not migrating.

14.10 Discussion of Conclusions

Based on the results of the aquifer test, it is evident that extraction of groundwater at the site to remove lead and cadmium, the only remaining constituents that warrant further consideration, will not be effective in removing mass or preventing migration of contaminants to potential off-site receptors. The results of chemical analyses of samples obtained at various times during the performance of the aquifer test show that the concentrations of lead and cadmium trend steadily toward very low levels as pumping progresses. This is likely due to the tendency for lead and cadmium to adsorb to coatings on soil particles. Also, as the size of the capture zone increases, dilution occurs. Based on this information, the pump-and-treat technique for the remediation of groundwater at the site will not be effective. Furthermore, the extraction of groundwater is not necessary to provide hydraulic control for the prevention of the migration of lead and cadmium. Because the zone of impact has been shown to be stationary and shrinking over time, it is evident that no net migration of lead and cadmium has occurred or will occur in the future. It is clear that the mass of lead and cadmium in groundwater is naturally declining. It is also clear that a reconsideration of the pump-and-treat remedy is warranted.

Several geochemical factors are believed to be the cause of the naturally-occurring removal of lead and cadmium from groundwater. The strong tendency for lead and cadmium to adsorb to coatings on soil particles is a primary reason for the immobility of these inorganic constituents and for their decreasing mass in groundwater. The factors that prevented lead and cadmium from being extracted during the aquifer test are also responsible for the stationary location of the zone of impact and the decrease in constituent concentrations within the zone (shrinking zone). While pH-dependent adsorption is likely the most prominent of the geochemical factors that are resulting in a natural improvement in groundwater quality at the site, other factors identified herein and in the Phase I Memorandum, such as precipitation, also contribute to the immobility of lead and cadmium and their disappearance from groundwater. Evidence of precipitation of lead as lead phosphate may be indicated in the results of the x-ray diffraction tests performed.

Based on the results of the evaluations performed, it is evident that the natural transfer of lead and cadmium from groundwater to the aquifer material is permanent. Lead and cadmium adsorb strongly in the coatings on soil particles. In this evaluation, neither lead nor cadmium were mobilized from the coatings until the coatings were dissolved. From the analyses performed, the coatings were not dissolved until a very aggressive test fluid was used (pH ≤ 2). In nature, there is no phenomenon that could reasonably be expected to occur that would cause the groundwater at the site to take on the characteristics of the aggressive test fluid. Therefore, as the trend toward higher pH with time is expected to continue, continued decreases in the mass of lead and cadmium are expected.

but dissolved to [ ] greater than 100 ppb!

Because groundwater quality has improved, the degree of risk posed by constituents in groundwater has correspondingly decreased. There are no off-site risks related to groundwater. Given the continuing improvement observed in groundwater quality, it is expected that any existing risks (i.e., on-site risks) possibly posed by constituents in groundwater will diminish. With institutional controls, any possible exposure to constituents on-site can be prevented. With the prevention of on-site risks through institutional controls, and the absence of off-site risks, there will be no risks related to groundwater. The improvement in groundwater quality and the diminishment of risks has occurred without any active remedy for groundwater being performed. Therefore, it is clear that a pump-and-treat remedy is unwarranted. Furthermore, it was shown that the pump-and-treat technique will fail to be effective; therefore it is not only unwarranted, but also it is an inappropriate remedy for the NL site.

Although no active remedial action is needed for groundwater, the evaluation of an alternative remedy that will speed the improvement of groundwater quality at the site may be useful. Monitoring of groundwater quality will continue to be performed, as described in Section 15.

15. RECOMMENDATIONS

The weight of evidence presented herein and in the Phase I Memorandum, shows that the pump-and-treat remedy selected for groundwater is inappropriate to address current groundwater conditions at the NL site. The evidence shows that the pump-and-treat technique will not be effective. From a risk perspective, no active remedy is needed. Therefore, the Group requests that the EPA consider a revision to the ROD-selected pump-and-treat remedy. To speed the naturally-occurring improvement of groundwater quality at the site, the Group proposes to implement an alternative remedy for consideration by the EPA. The alternative remedy that is expected to perform optimally for groundwater at the NL site is augmentation of natural geochemical reactions through injection of stabilizing agents to treat groundwater in-situ, combined with monitoring. The injection of stabilizing agents (i.e. alkalinity) would enhance naturally-occurring geochemical reactions. The stabilizing agents would buffer pH and stimulate the precipitation and sorption of lead, cadmium, and other inorganics. By using this technique, the remedy for groundwater could be completed in the shortest time frame.

Based on the results of the Phase I and II groundwater evaluations, significant improvement of groundwater quality was observed and it is expected to continue with or without remedial actions being performed. However, the Group will perform the remedy for soil and sediment described in the Final Design Report Remedial Design for Soil and Sediment [GeoSyntec, 1999] in calendar year 2000. The remedy for soil and sediment includes the removal of soil and sediment from portions of the site that contain lead at concentrations above 500 ppm. Following the performance of the remedy for soil and sediment, any impact that the lead-containing soil may have had on groundwater will be eliminated and groundwater quality may more rapidly improve. Therefore, with the possible implementation of the proposed alternative remedy for groundwater, the Group recommends that monitoring of groundwater quality at the site be performed during the five-year project review period established by EPA for Superfund sites, or until RAOs are achieved, whichever comes first. Based on the observed immobility of the zone of impact in groundwater, a frequency of semi-annual monitoring (i.e. spring and fall, beginning in the spring of 2000) will be more than adequate to monitor the expected natural and possibly augmented improvement (if the alternative remedy is performed) in groundwater quality. It is recommended that the parameters to be monitored include as a minimum pH, total and dissolved lead, cadmium, VOCs, and radiological parameters. It is further recommended that the sampling and quality control procedures established in the SAMP and the QAPP be generally used throughout the monitoring program.

The Group recommends that a plan be prepared to document, in detail, the scope of the monitoring program described above. In the plan, the wells to be monitored will be identified and additional detail regarding chemical analyses and data evaluation will be provided. Also, provided that the EPA agrees, the Group recommends that a pilot-scale demonstration of the alternative remedy be performed. Any future activities that may be needed will be discussed with the EPA following the performance of the pilot-scale demonstration of the alternative remedy.

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TABLE 1-1

REMEDIAL ACTION OBJECTIVES[1] (RAOs) FOR GROUNDWATER

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

	NJMCL[2]	NJGWQS[3]	PQL[4]	MCL[5]
Organic Contaminants (ppb)				
Acetone	-	700	NA	-
Bis-(2-ethylhexyl)phthalate	4	3	30	-
Chloroform	-	6	1	-
1,2-Dibromomethane	-	-	-	-
1,1-Dichloroethane	-	70	-	-
1,1-Dichloroethylene	2	1	2	7
1,2-Dichloropropane	5	0.5	1	5
Ethylbenzene	700	700	5	700
Naphthalene	-	-	-	-
N-Nitroso-di-n-propylamine	-	0.005	20	-
Tetrachloroethylene	1	0.4	1	5
Toluene	1,000	1,000	5	1,000
1,1,1-Trichloroethane	26	30	1	200
1,2,4-Trimethylbenzene	-	-	-	-
1,3,5-Trimethylbenzene	-	-	-	-
Vinyl Chloride	2	0.08	5	2
Xylene(s) (total)	44	40	2	10,000
o-	-	NA	1	-
m&p-	-	NA	2	-
Inorganic Contaminants (ppb)				
Antimony	6	2	20	6
Arsenic (total)	50	0.02	8	50
Beryllium	4	0.008	20	4
Cadmium	5	4	2	5
Chromium (total)	100	100	10	100
Copper	1300[6]	1,000	1,000	-
Cyanide	200	200	40	200
Lead (total)	15[6]	5	10	-
Mercury (total)	2	2	0.5	2
Nickel (soluble salts)	100	100	10	100

TABLE 1-1
(continued)

	NJMCL[2]	NJGWQS[3]	PQL[4]	MCL[5]
Selenium (total)	50	50	10	50
Silver	-	NA	2	-
Thallium	2	0.5	10	2
Zinc	-	5,000	30	-
Radiation[(7)]				
Gross Alpha	15	15	-	15
Gross Beta	4	4	-	4

Notes:

[1] Remedial Action Objectives (RAOs) for groundwater are defined in the ROD [USEPA, 1994] as "to restore the contaminated unconfined aquifer to drinking water standards for all contaminants. Established remedial action objectives for each contaminant of concern for groundwater are listed in Table F." The information presented herein was obtained from Table F of the ROD.

[2] New Jersey Maximum Contaminant Levels (NJMCLs) are expressed in parts per billion (ppb) (N.J.A.C 7:10-16.7)

[3] New Jersey Ground Water Quality Standards (NJGWQS) (N.J.A.C. 7:9-6) are expressed in ppb, except where noted.

[4] The Practical Quantitation Levels (PQLs) are expressed in ppb. In accordance with N.J.A.C. 7:9-6.9(c), where a constituent standard (the criterion adjusted by the antidegradations policy and applicable criteria exemptions) is of a lower concentration than the relevant PQL, the Department shall not (in the context of an applicable regulatory program) consider the discharge to be causing a contravention of that constituent standard so long as the concentration of the constituent in the affected ground water is less than the relevant PQL. For any listed contaminant, the more stringent of the NJMCL, NJGWQS, or Federal MCL applies. If the PQL is greater than the NJMCL, NJGWQS or the MCL, then the PQL applies.

[5] Federal Maximum Contaminant Levels (MCLs) are expressed in ppb, except where noted.

[6] New Jersey Action Level.

[7] Federal MCL expressed in picocuries/liter (pCi/L).

TABLE 1-2

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

TASK DESCRIPTION

- Install 12 new monitoring wells
- Sample new wells and analyze for VOCs, radiological parameters, total and dissolved lead and cadmium
- Sample existing wells BR, 11, OS, OD, NS, ND, 12, JS, JD, SS, SD and analyze for VOCs and total and dissolved lead and cadmium
- Sample eight private wells and analyze for total and dissolved lead and cadmium
- Perform former septic bed evaluation
- Obtain soil samples for analysis of radiological parameters
- Perform landfill siting evaluation
- Perform aquifer test and capture zone evaluation
- Refine three-dimensional site hydrogeologic model
- Obtain three to five soil samples for geomembrane testing (e.g., adsorption/desorption/ speciation)
- Perform limited fate and transport modeling
- Review Risk Assessment related to groundwater
- Report results in Phase II technical memorandum

TABLE 2-1

LEAD AND CADMIUM MASS BALANCE

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

	PARAMETERS	1983	1988	1998
LEAD	Zone of Impact Volume	58,000,000 ft^3		8,000,000 ft^3
	Volume of Groundwater Impacted	130,000,000 gal		18,000,000 gal
	Average Concentration	200 ppb		60 ppb
	Mass of Lead in Groundwater	220 lbs/100 Kg		9 lbs/4 Kg
	Mass of Soil in Zone of Impact	2.6×10^7 Kg		3.6×10^6 Kg
	Average lead concentration in soil after adsorption	**0.4 mg/Kg**		**1.1 mg/Kg**
CADMIUM	Zone of Impact Volume		37,000,000 ft^3	11,000,000 ft^3
	Volume of Groundwater Impacted		83,000,000 gal	25,000,000 gal
	Average Concentration		100 ppb	20 ppb
	Mass of Cadmium in Groundwater		70 lbs/32 Kg	14 lbs/6.4 Kg
	Mass of Soil in Zone of Impact		1.7×10^7 Kg	5×10^6 Kg
	Average cadmium concentration in soil after adsorption		**1.9 mg/Kg**	**1.3 mg/Kg**

Notes: Assume average aquifer porosity of 30%.
Assume average soil density of 105 lbs/ft^3.

TABLE 2-2

CONSTITUENTS OF CONCERN IN GROUNDWATER[1]

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Constituent Identification	Frequency of Detection[(2)] (No. of Detects/No. of Samples)	Range of Concentrations Detected[(2)] (μg/l)
Arsenic	34/51	<1 - 4,900
Beryllium	Not Reported	Not Reported
Lead	65/73	1 - 6,290
1,1-Dichloroethane	2/10	54 - 74
1,1-Dichloroethylene	2/10	170 - 210
Tetrachloroethene	2/10	180 - 210
Vinyl Chloride	1/10	76

Notes:

1 The constituents of concern listed above were identified by the USEPA for the purpose of assessing risk at the NL Industries site. The data were obtained during the RI and were summarized as Table A in the ROD.

2 The frequency and range of detections shown in the table were provided by USEPA and do not include data from the Phase I or Phase II groundwater evaluations performed by GeoSyntec.

TABLE 3-1

SUMMARY OF LABORATORY ANALYTICAL RESULTS
FORMER SEPTIC BED EVALUATION

Phase II Groundwater Evaluation
NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Sample Location / Sample Designation / Date / Time / Depth	Septic Bed - West (SVSBW10-15070998) 07/09/1998 1200 10 - 15 ft bgs	Septic Bed - East (SBE10-15070998) 07/09/1998 1000 10 - 15 ft bgs
COMPOUND (ug/kg)[1]		
Chloromethane	<12	<11
Bromomethane	<12	<11
Vinyl chloride	<12	<11
Chloroethane	<12	<11
Methylene chloride	<12	<11
Acetone	19	<11
Carbon disulfide	<12	<11
1,1-Dichloroethene	<12	<11
1,1-Dichloroethane	<12	<11
1,2-Dichloroethene (total)	<12	<11
Chloroform	<12	<11
1,2-Dichloroethane	<12	<11
2-Butanone	<12	<11
1,1,1-Trichloroethane	<12	<11
Carbon tetrachloride	<12	<11
Bromdichloromethane	<12	<11
1,2-Dichloropropane	<12	<11
cis-1,3-dichloropropene	<12	<11
Trichloroethene	<12	<11
Dibromochloromethane	<12	<11
1,1,2-Trichloroethane	<12	<11
Benzene	<12	<11
trans-1,3-Dichloropropene	<12	<11
Bromoform	<12	<11
4-Methyl-2-pentanone	<12	<11
2-Hexanone	<12	<11
Tetrachloroethene	<12	<11
1,1,2,2-Tetrachloroethane	<12	<11
Toluene	<12	<11
Chlorobenzene	<12	<11
Ethylbenzene	<12	<11
Styrene	<12	<11
Xylenes (total)	<12	<11
bis (2-Ethylhexyl) phthalate	**380 J**	**61 J**
Naphthalene	<390	<370
N-Nitrosodi-n-propylamine	<390	<370
1,2,4-trimethylbenzene	ND	ND
1,3,5-trimethylbenzene	ND	ND
Antimony	<0.32 N	**0.36 BN**
Arsenic	**4.9**	**3.9**
Beryllium	**0.23 B**	**0.18 B**
Cadmium	<0.09	<0.09
Chromium	**10.4**	**10.2**
Copper	**2.5 B**	**2.3 B**
Lead	**14.0N*J**	**19.1N*J**
Mercury	<0.12	<0.11
Nickel	**3.4 B**	**2.2 B**
Selenium	<0.86	<0.82
Silver	<0.09	<0.09
Thallium	<1.1	<1.1
Zinc	**9.1 E**	**8.9 E**
Cyanide	<2.9	<2.8

Notes:
(1) Laboratory results of soil samples analyzed according to Organic SOW 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.
ft-bgs = feet below ground surface
ND = Not detected. The analysis of 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene was completed through a search of the primary, secondary, and tertiary m/z over the entire chromatographic range of the analysis. Standards were not analyzed for these two compounds. When these compounds were identified, an arbitrary response factor of "1" was used to calculate the results, as would be the case for a routine library search.

TABLE 3-2

CONCENTRTIONS OF RADIOLOGICAL PARAMETERS IN SOIL
FORMER SEPTIC BED EVALUATION[1]

Phase II Groundwater Evaluation
NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Sample Location	Sample Designation	Sample Date	Sample Time	Depth, ft bgs	Gamma Spec Cesium - 137 (PCI/G)	Gross Alpha (PCL/L)	Gross Beta (PCL/L)	Alpha Spec Thorium - 232 (PCI/G)	Alpha Spec Uranium - 234 (PCI/G)	Alpha Spec Uranium - 238 (PCI/G)	Alpha Spec Uranium - 235/236 (PCI/G)	Gamma Spec Protactinium - 231 (PCI/G)	Gamma Spec Thorium - 234 (PCI/G)	Gamma Spec Potassium - 40 (PCI/G)
Septic Bed West	SVSBW10-15070998	07/09/1998	1200	10 - 15	<0.023	1.23+-3.54	20.4+-4.6					26.4 +- 12.8		4.01 +- 0.56
Septic Bed East	SVSBE10-15070998	07/09/1998	1000	10 - 15	0.033 +- 0.021	7.41+-4.74	19.5+-4.5				0.096 +- 0.088	1.78 +- 1.14	0.49 +- 0.36	4.69 +- 0.88

Sample Location	Sample Designation	Sample Date	Sample Time	Depth, ft bgs	Gamma Spec Lead - 212 (PCI/G)	Gamma Spec Lead - 214 (PCI/G)	Gamma Spec Lead - 210 (PCI/G)	Gamma Spec Bismuth - 212 (PCI/G)	Gamma Spec Bismuth - 214 (PCI/G)	Gamma Spec Thorium - 238 (PCI/G)	Gamma Spec Thorium - 231 (PCI/G)	Gamma Spec Radium - 224 (PCI/G)	Gamma Spec Thallium - 208 (PCI/G)	Gamma Spec Actinium - 228 (PCI/G)
Septic Bed West	SVSBW10-15070998	07/09/1998	1200	10-15	0.41 +- 0.07	0.32 +- 0.09		0.44 +- 0.24	0.29 +- 0.07				0.12 +- 0.03	0.31 +- 0.13
Septic Bed East	SVSBE10-15070998	07/09/1998	1000	10-15	0.32 +- 0.51	0.39 +- 0.07	0.32 +- 0.31	0.35 +- 0.26	0.28 +- 0.08	0.85 +- 0.79	0.16 +- 0.14	0.74 +- 0.50	0.046 +- 0.027	0.25 +- 0.13

Note:

[1] Laboratory results of groundwater samples analyzed using DOE EML HASL 300.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 5-1

RATIONALE FOR NEW MONITORING WELL LOCATIONS AND DEPTHS

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

MONITORING WELL	RATIONALE
22, 23	Evaluate groundwater quality on the eastern side of the former maufacturing area and near existing wells HS and HD
24	Evaluate groundwater quality in the first confined aquifer in the area northwest of the former manufacturing area Verify the continuity of the confining clay layer
26	Evaluate groundwater quality in the area between the former manufacturing area and the existing landfill Verify the continuity of the confining clay layer Evaluate groundwater quality in the area between the former manufacturing area and the existing landfill
27,28	Evaluate groundwater quality beneath the concrete pad in the northeastern section of the former manufacturing area Evalauate subsurface soil quality and geochemical characteristics
29, 30	Evaluate groundater quality beneath the concrete pad in thecentral portion of the former manufacturing area Evalauate subsurface soil quality and geochemical characteristics
30, 31	Evaluate former septic bed as potential source of constituents in groundwater
33, 34	Evaluate the extent of groundwater constituents north of the NL landfill Evaluate subsurface soil quality and geochemical charcteristics
PW	To be used as the extraction well during the constant rate aquifer test Evaluate trends in constituent concentrations and water levels during the constant rate aquifer test
OW	Obtain groundwater level data during the constant rate aquifer test

TABLE 5-2

SUMMARY OF NEW WELL CONSTRUCTION DETAILS

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well	Casing Diameter (in.)	Well Depth(2)	Screened Interval(3)	Top of Casing Elevation(4)
Monitoring Wells Screened in the Unconfined Aquifer				
22	2	16.0	11.0 - 16.0	13.01
23	2	24.0	24.0 - 34.0	12.85
26	2	22.0	12.0 - 22.0	10.77
27	2	15.0	5.0 - 15.0	15.45
28	2	30.0	20.0 - 30.0	15.28
29	2	15.0	5.0 - 15.0	15.14
30	2	30.0	20.0 - 30.0	15.17
31	2	15.0	5.0 - 15.0	13.21
32	2	30.0	20.0 - 30.0	13.16
33	2	10.0	5.0 - 10.0	5.44
34	2	20.0	10.0 - 20.0	5.44
Monitoring Wells Screened in the First Confined Aquifer				
Monitoring Well	Casing Diameter (in.)	Well Depth(2)	Screened Interval(3)	Top of Casing Elevation(4)
24	2	73.0	68.0 - 73.0	11.92
Aquifer Test Wells				
PW	6	26.0	26.0 - 6.0	10.43
OW	2	26.0	26.0 - 6.0	10.71

Notes:

(1) Height of protective steel casing in feet above ground surface.
(2) Depth to bottom of well in feet below top of casing.
(3) Screened interval of well in feet below ground surface.
(4) Top of casing elevation in feet above mean sea level.
*Well is obstructed at approximately 11 feet below ground surface.

TABLE 5-3

SUMMARY OF SOIL SAMPLE ANALYSES AND TEST METHODS FOR SOIL SAMPLES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

ANALYTE	LABORATORY METHOD
Quanterra Laboratories	
Volatile Organic Compounds	SOW 0LM01.9
Base/Neutral/Acid Extratable Compounds	SOW 0LM01.9
Total Metals	SOW 1LM04
Sulfide (acid-insoluble)	SW846 9030A
Carbonate Alkalinity	MCAWW 310.1
Total Organic Carbon	SMCA Walkey-Blac
Sufate	MCAWW 375.4
Total Phosphorus	MCAWW 365.2
Phosphate as P, ortho	MCAWW 365.2
Percent Solids	MCAWW 160.3
pH	SW846 9045C (MOD)
Core Laboratories	
Thin Section Petrographic analysis	Laboratory Specific
X-Ray Diffraction	Laboratory Specific
ToxScan, Inc.	
Carbonate Cadmium	EPA 200.8
Carbonate Lead	EPA 200.8
Cation-Exchange Capacity	EPA 9081
Extractable Cadmium	EPA 200.8
Extractable Lead	EPA 200.8
Iron/Manganeze Oxide/Hydroxide Lead	EPA 200.8
Organic Cadmium	EPA 200.8
Organic Lead	EPA 200.8
Percent Solids	EPA 160.3
pH	EPA 9045B
Residual Cadmium	EPA 200.8
Residual Lead	EPA 200.8
Total Metals	EPA 6020

TABLE 6-1

Concentrations of Total Lead in Soil

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location	Septic Bed - West	Septic Bed - East	Well 29	Well 28	Well 26	Well 34
Sample Designation	(SVSBW10-15070998)	(SVSBE10-15070998)	(SV2910-12071598)	(SV288-12071698)	(SV2610-14072098)	(SV34-050699)
Date	07/09/1998	07/09/1998	07/15/1998	07/16/1998	07/20/1998	05/06/1999
Time	1200	1000	930	1110	1500	1030
Depth	10 - 15 ft bgs	10 - 15 ft bgs	10 - 12 ft bgs	8 - 12 ft bgs	10 - 14 ft bgs	
COMPOUND (mg/kg)(1)						
Total Lead	14.0N*J	19.0N*J	1.8N*J	1.2N*J	2.7N*J	0.56 B

Notes:
(1) Laboratory results of soil samples analyzed according to Inorganic SOW ILM04.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.
ft bgs = feet below ground surface

TABLE 6-2

Concentrations of Volatile Organic Compounds in Soil

NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Sample Location Sample Designation Date Time Depth	Septic Bed - West SVSBW10-15070998 07/09/1998 1200 10 - 15 ft bgs	Septic Bed - East SVSBE10-15070998 07/09/1998 1000 10 - 15 ft bgs	Well 29 SV2910-12071598 07/15/1998 930 10 - 12 ft bgs	Well 28 SV288-12071698 07/16/1998 1110 8 - 12 ft bgs	Well 26 SV2610-14072098 07/20/1998 1500 10 - 14 ft bgs	Well 34 (SV34-050699) 05/06/1999 1030 6 - 12 ft bgs
COMPOUND (ug/kg)(1)						
Chloromethane	<12	<11	<12	<12	<12 J	<12
Bromomethane	<12	<11	<12	<12	<12	<12
Vinyl chloride	<12	<11	<12	<12	<12 J	<12
Chloroethane	<12	<11	<12	<12	<12	<12
Methylene chloride	<12	<11	<12	<12	<12 J	<12
Acetone	19	<11	<12	<12	<12	<12
Carbon disulfide	<12	<11	<12	<12	<12	<12
1,1-Dichloroethene	<12	<11	<12	<12	<12	<12
1,1-Dichloroethane	<12	<11	<12	<12	<12	<12
1,2-Dichloroethene (total)	<12	<11	<12	<12	<12	<12
Chloroform	<12	<11	<12	<12	<12	<12
1,2-Dichloroethane	<12	<11	<12	<12	<12	<12
2-Butanone	<12	<11	<12	<12	<12	<12
1,1,1-Trichloroethane	<12	<11	<12	<12	<12	<12
Carbon tetrachloride	<12	<11	<12	<12	<12	<12
Bromdichloromethane	<12	<11	<12	<12	<12	<12
1,2-Dichloropropane	<12	<11	<12	<12	<12	<12
cis-1,3-dichloropropene	<12	<11	<12	<12	<12	<12
Trichloroethene	<12	<11	<12	<12	<12	<12
Dibromochloromethane	<12	<11	<12	<12	<12	<12
1,1,2-Trichloroethane	<12	<11	<12	<12	<12	<12
Benzene	<12	<11	<12	<12	<12	<12
trans-1,3-Dichloropropene	<12	<11	<12	<12	<12	<12
Bromoform	<12	<11	<12	<12	<12	<12
4-Methyl-2-pentanone	<12	<11	<12	<12	<12	<12
2-Hexanone	<12	<11	<12	<12	<12	<12
Tetrachloroethene	<12	<11	<12	<12	<12	<12
1,1,2,2-Tetrachloroethane	<12	<11	<12	<12	<12	<12
Toluene	<12	<11	<12	<12	<12	<12
Chlorobenzene	<12	<11	<12	<12	<12	<12
Ethylbenzene	<12	<11	<12	<12	<12	<12
Styrene	<12	<11	<12	<12	<12	<12
Xylenes (total)	<12	<11	<12	<12	<12	<12

Notes:
(1) Laboratory results of soil samples analyzed according to Organic SOW 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.
ft bgs = feet below ground surface

TABLE 6-3

Concentrations of Radiological Parameters in Soil[1]

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location	Sample Designation	Sample Date	Sample Time	Depth, ft bgs	Gross Alpha (pCi/L)[1]	Gross Beta (pCi/L)[1]
Septic Bed West	SVSBW10-15070998	07/09/1998	1200	10 - 15	1.23 +- 3.54	20.4 +- 4.6
Septic Bed East	SVSBE10-15070998	07/09/1998	1000	10 - 15	7.41 +- 4.74	19.5 +- 4.5
26	SV2610-14072098	07/20/1998	1500	10 - 14	3.08 +- 4.04	6.35 +- 3.20
28	SV288-12071698	07/16/1998	1110	8 - 12	3.64 +- 2.54	11.0 +- 2.8
29	SV2910-12071598	07/15/1998	930	10 - 12	7.72 +- 3.34	28.5 +- 4.2
34	SV34-050699	05/06/1999	1030	6-12	4.41 +- 2.79	10.6 +- 2.8

Sample Location	Sample Designation	Sample Date	Sample Time	Depth, ft bgs	Gamma Spec Cesium - 137 (PCI/G)	Alpha Spec Thorium - 228 (PCI/G)	Alpha Spec Thorium - 230 (PCI/G)	Alpha Spec Thorium - 232 (PCI/G)	Alpha Spec Uranium - 234 (PCI/G)	Alpha Spec Uranium - 238 (PCI/G)	Alpha Spec Uranium - 235/236 (PCI/G)	Gamma Spec Protactinium - 231 (PCI/G)	Gamma Spec Thorium - 234 (PCI/G)	Gamma Spec Potassium - 40 (PCI/G)
Septic Bed West	SVSBW10-15070998	07/09/1998	1200	10 - 15	<0.023							26.4 +- 12.8		4.01 +- 0.56
Septic Bed East	SVSBE10-15070998	07/09/1998	1000	10 - 15	0.033 +- 0.021						0.096 +- 0.088	1.78 +- 1.14	0.49 +- 0.36	4.69 +- 0.88
26	SV2610-14072098	07/20/1998	1500	10 - 14	<0.18									
28	SV288-12071698	07/16/1998	1110	8 - 12	<0.21	0.14 +- 0.10	0.85 +- 0.28	0.26 +- 0.13	0.22 +- 0.15	0.22 +- 0.14	-0.005 +- 0.056			
29	SV2910-12071598	07/15/1998	930	10 - 12	<0.23									6.24 +- 3.09
34	SV34-050699	05/06/1999	1030	6-12	<0.11									2.83 +- 1.34

Sample Location	Sample Designation	Sample Date	Sample Time	Depth, ft bgs	Gamma Spec Lead - 212 (PCI/G)	Gamma Spec Lead - 214 (PCI/G)	Gamma Spec Lead - 210 (PCI/G)	Gamma Spec Bismuth - 212 (PCI/G)	Gamma Spec Bismuth - 214 (PCI/G)	Gamma Spec Thorium - 238 (PCI/G)	Gamma Spec Thorium - 231 (PCI/G)	Gamma Spec Radium - 224 (PCI/G)	Gamma Spec Thallium - 208 (PCI/G)	Gamma Spec Actinium - 228 (PCI/G)
Septic Bed West	SVSBW10-15070998	07/09/1998	1200	10-15	0.41 +- 0.07	0.32 +- 0.09		0.44 +- 0.24	0.29 +- 0.07				0.12 +- 0.03	0.31 +- 0.13
Septic Bed East	SVSBE10-15070998	07/09/1998	1000	10-15	0.32 +- 0.51	0.39 +- 0.07	0.32 +- 0.31	0.35 +- 0.26	0.28 +- 0.08	0.85 +- 0.79	0.16 +- 0.14	0.74 +- 0.50	0.046 +- 0.027	0.25 +- 0.13
26	SV2610-14072098	07/20/1998	1500	10-14	0.41 +- 0.24									
28	SV288-12071698	07/16/1998	1110	8-12										
29	SV2910-12071598	07/15/1998	930	10-12	0.65 +- 0.20									
34	SV34-050699	05/06/1999	1030	6-12	0.15 +- 0.09	0.33 +- 0.14								

Notes:

[1] Laboratory results of groundwater samples analyzed using DOE EML HASL 300.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

ME0015/MD99690.XLS

TABLE 6-4

General Chemical Analysis of Soil

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location Sample Designation Date Time	**26** (SV2610-14072098) 07/20/1998 1500	**28** (SV288-12071698) 07/16/1998 1110	**29** (SV2910-12071598) 07/15/1998 930	**34** (SV34050699) 05/06/1999 1030
Acid-insoluble sulfide	<61.4	90.9 J	<61.5	93.2
Carbonate Alkalinity	<123 J	<122 J	<123 J	NT
Total Organic Carbon	3290	1120	<61.5	<59.4
Sulfate	<304 J	<122 J	<308 J	353
Total Phosphorous	<12.3 J	<12.2 J	<12.3 J	NT
Phosphate as P, ortho	6.1 J	<1.2 J	<1.2 J	NT
Percent Solids	81.4	82.3	81.3	84.2
pH (no units)	6.1 J	7.0 J	7.6 J	NT

NT - Not Tested

(1) For a summary of USEPA Laboratory Analytical Qualifiers, see Appendix F.

TABLE 6-5

SUMMARY OF MINERALOGICAL TESTING RESULTS

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Analyte	Units	SV2910-12071598	SV2812-16071698	SV26072098
Carbonate Cadmium	mg/kg	<0.1	<0.1	<0.1
Carbonate Lead	mg/kg	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100 g dw	3.57	1.13	2.72
Extractable Cadmium	mg/kg	<0.1	<0.1	<0.1
Extractable Lead	mg/kg	<0.1	<0.1	<0.1
Hydroxide Cadmium	mg/kg	<0.1	<0.1	<0.1
Iron	mg/kg	120	26	34
Hydroxide Lead	mg/kg	0.36	<0.1	0.14
Manganese	mg/kg	33	<0.1	<0.1
Organic Cadmium	mg/kg	<0.1	<0.1	<0.1
Organic Lead	mg/kg	<0.1	<0.1	<0.1
Percent Solids	percent	83	82	80
pH	pH units	7.3	6.6	6.2
Residual Cadmium	mg/kg	<0.1	<0.1	<0.1
Residual Lead	mg/kg	2.2	0.96	1.6
Total Cadmium	mg/kg	<0.10	<0.10	<0.10
Total Lead	mg/kg	2.8	1.9	4.1

TABLE 7-1
SUMMARY OF GROUNDWATER SAMPLING LOCATIONS AND ANALYSES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Location	Date	Lead and Cadmium	Low Level VOA	Gross Alpha/Beta	Alpha Spectroscopy	Gamma Spectroscopy	General Chemistry (1)
EXISTING WELLS							
JS	07/08/1998	X	X				
JD	07/08/1998	X	X				
I2	07/10/1998	X	X				
SD	07/09/1998	X	X				
BR	07/09/1998	X	X				
I1	07/10/1998	X	X				
SS	07/10/1998	X	X				
OS	9/24/98 (2)	X	X				
NS	07/13/1998	X	X				
ND	07/13/1998	X	X				
OD	07/14/1998	X	X				
EXXON-2 (3)	01/26/1999	X	X	X		X	
NEW WELLS							
22 (4)	07/23/1998	X	X	X		X	
23	07/23/1998	X	X	X		X	
24	07/22/1998	X	X	X		X	
26 (4)	09/23/1998	X	X	X	X	X	X
27	07/21/1998	X	X	X	X	X	X
28	07/21/1998	X	X	X	X	X	
29	07/20/1998	X	X	X	X	X	X
30	07/20/1998	X	X	X	X	X	
31	07/15/1998	X	X	X		X	
32 (3)	07/15/1998	X	X	X	X	X	
33	05/19/1999	X	X	X		X	X
34	05/21/1999	X	X	X		X	
RESIDENTIAL WELLS							
CCC	07/10/1998	X					
CRUZ	07/10/1998	X					
WISTAR	07/13/1998	X					
KINNEY	07/14/1998	X					
GATES	07/14/1998	X					
MCCOURT	07/22/1998	X					
CASSANO	07/23/1998	X					
EYLER	7/24/98 (2)	X					
BUTCHER	01/26/1999	X					
AQUIFER TEST WELLS							
PW-1 (5)		X	X				X (6)

NOTES:

(1) General chemistry parameters included a full general mineral analysis (calcium, iron, magnesium, manganese, potassium, sulfate, chloride, alkalinity -speciated, nitrate, nitrite, and pH), phosphate species, TSS, TDS,. and sulfides.
(2) Two samples obtained from location on two separate dates.
(3) Matrix spike/Matrix spike duplicate obtained from location.
(4) Blind duplicate sample collected from location.
(5) Samples obtained during the aquifer-test at the following elapsed time intervals; .5 hrs, 1hr., 2 hr., 3 hr., 8 hr., then approximately every eight hours for the remainder of the test.
(6) Aquifer test groundwater samples were analyzed for the following general chemistry parameters.

TABLE 7-2

MONITORING WELL CONSTRUCTION DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Wells Screened in the Unconfined Aquifer						
Monitoring Well	**Casing Diameter (in.)**	**Well Depth[2]**	**Screened Interval[3]**	**Top of Casing Elevation[4]**	**Depth To Water[5]**	**Pump Setting[6]**
BR	4	39.0	33.0-39.0	10.82	5.25	35.0
JS	2	17.0	17.0 - 27.0	13.89	7.68	10.0*
JD	2	27.7	17.7-27.7	14.02	7.78	22.0
NS	2	16.5	6.5 - 16.5	13.24	8.71	14.5
ND	2	24.0	14.0 - 24.0	12.29	7.91	20.0
OS	2	21.3	6.3 - 21.3	10.92	8.79	16.5
OD	2	37.3	12.3 - 37.3	13.38	8.53	25.0
SS	2	16.4	6.4 - 16.4	12.70	6.05	11.5
SD	2	29.4	17.4-29.4	13.39	7.07	23.0
11	4	54.1	34.1 - 54.1	11.19	5.27	42.5
22	2	16.0	11.0 - 16.0	13.01	10.01	15.0
23	2	24.0	24.0 - 34.0	12.85	9.78	30.0
26	2	22.0	12.0 - 22.0	10.77	5.83	17.0
27	2	15.0	5.0 - 15.0	15.45	11.48	13.0
28	2	30.0	20.0 - 30.0	15.28	11.37	25.0
29	2	15.0	5.0 - 15.0	15.14	11.12	12.0
30	2	30.0	20.0 - 30.0	15.17	NA	25.0
31	2	15.0	5.0 - 15.0	13.21	9.42	10.0
32	2	30.0	20.0 - 30.0	13.16	9.79	25.0
33	2	10.0	5.0 - 10.0	5.44	3.96	8.0
34	2	20.0	10.0 - 20.0	5.44	4.03	18.0
Exxon Well No. 2	NA	NA	NA	NA	6.73	20.0
Monitoring Wells Screened in the First Confined Aquifer						
Monitoring Well	**Diameter (in.)**	**Depth[2]**	**Interval[3]**	**Elevation[4]**	**Depth To Water[5]**	**Pump Setting[6]**
12	4	78.2	58.2 - 78.2	12.81	15.58	68.0
24	2	73.0	68.0 - 73.0	11.92	17.42	71.0

Notes:

(1) Height of protective steel casing in feet above ground surface.
(2) Depth to bottom of well in feet below top of casing.
(3) Screened interval of well in feet below ground surface.
(4) Top of casing elevation in feet above mean sea level.
(5) Depth to water in feet below top of casing.
(6) Depth to pump intake in feet below ground surface.
* Well is obstructed at approximately 11 feet below ground surface.

TABLE 7-3

CONCENTRATIONS OF LEAD AND CADMIUM IN GROUNDWATER

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Well	Lead Concentration (ug/L)[1]		Cadmium Concentration (ug/L)[1]	
	Total	Filtered	Total	Filtered
BR	<1.1 NJ	1.4 BNJ	**16.0**	**15.0**
JS	<1.1 NJ	<1.1 NJ	**1.4 B**	**1.5 B**
JD	<2.2 NJ	<2.2 NJ	**200**	**207**
NS	**5.1 NJ**	<1.1 N	**0.70 B**	<0.40
ND	<1.1 NJ	<2.2 NJ	**0.42 B**	**1.5 B**
OS[2]	**476 NJ**	**6.8 NJ**	**4.7 B**	**2.9 B**
OS[3]	281	365	1.8B	2.1B
OD	**<5.5 NJ**	**<11.0 NJ**	<2.0	**3.0 B**
SS	**<1.1 NJ**	**<2.2 NJ**	**22.7**	**18.2**
SD	**25.6 NJ**	**24.0 NJ**	**184**	**169**
11	**1.4 BNJ**	**<1.1NJ**	**240**	**253**
22	**1.9 B**	**4.9**	**92.0**	**86.2**
23	**1.6 B**	**1.5 B**	**12.9**	**12.1**
26	<11.0	**49.2BJ**	<11.0	41.6B
27	**19.9**	**21.0**	**14.8**	**14.5**
28	**15.4**	**13.0**	**383**	**360**
29	3.0 B	1.4 B	0.59 B	0.76 B
30	**37.4**	**36.8**	**327**	**341**
31	<1.1	<2.2	<0.40	<0.40
32	<1.1	<1.1	<0.40	<0.40
33	**1.6 B**	<0.92	<3.0	<3.0
34	**8.6**	<0.92	<3.0	<3.0
Exxon MW-2	<1.0	<1.0	<0.30	<0.30
12	<1.1 N	<2.2 N	<0.40	**0.94 B**
24	<1.1	<1.1	<0.40	<0.40

Notes:

(1) Laboratory results of groundwater samples analyzed by USEPA SOW ILM04.0.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

(2) Sample obtained 7/31/1998.

(3) Resample obtained 9/24/1999.

TAB[illegible]-4

SUMMARY OF FIELD MEASUREMENTS

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well	Date Sampled	pH	Conductivity (mS/cm)	Redox (+/- mv)	Dissolved Oxygen (ppm)	Turbidity (NTU)
Monitoring Wells Screened in the Unconfined Aquifer						
BR	07/09/1998	6.8	1.83	+108	0.93	0.5
JS	07/08/1998	5.3	0.09	+276	2.93	23.0
JD	07/08/1998	3.6	0.37	+398	2.63	2.6
NS	07/13/1998	5.9	0.21	+178	1.14	4.0
ND	07/13/1998	5.2	0.39	+125	0.30	18.8
OS	07/13/1998	4.5	4.66	-14	0.38	11.8
OD	07/14/1998	3.9	5.38	-72	0.60	4.7
SS	07/10/1998	5.5	1.01	+34	NR	5.9
SD	07/09/1998	3.0	8.74	+309	NR	12.7
11	07/10/1998	5.7	1.40	+177	1.57	7.7
22	07/23/1998	4.4	0.37	+373	NR	0.4
23	07/23/1998	3.1	2.25	+426	NR	2.3
26	09/23/1998	4.1	1.30	+182	13.7	NR
27	07/21/1998	5.1	1.05	+110	0.23	5.0
28	07/21/1998	3.6	4.38	+238	0.25	4.1
29	07/20/1998	6.4	1.87	-36	0.35	3.3
30	07/20/1998	4.9	2.10	+100	0.25	38
31	07/15/1998	6.3	0.50	-114	NR	45
32	07/15/1998	5.9	0.24	-210	0.28	12.6
33	05/19/1999	5.4	1.42	-325	1.65	32
34	05/21/1999	5.8	2.71	NR	NR	1100
Exxon MW-2	01/26/1999	6.4	0.38	-86	10.95	<10
Monitoring Wells Screened in the First Confined Aquifer						
Monitoring Well	**Date Sampled**	**pH**	**Conductivity (mS/cm)**	**Redox (+/- mv)**	**Dissolved Oxygen (ppm)**	**Turbidity (NTU)**
12	07/08/1998	5.9	0.54	-9	0.74	74.5
24	07/22/1998	5.7	0.07	+15	NR	22.2

Notes:
mS/cm = microSeimens per centimeter
mv = millivolts
ppm = parts per million
NTU = nephelometric turbidity units
NR = Not recorded due to meter malfunction

TABLE 7-5

LEAD CONCENTRATIONS AND TURBIDITY VALUES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Wells Screened in the Unconfined Aquifer				
Monitoring Well	**Date Sampled**	**Turbidity (NTU)**	**Lead Concentration (ug/L)[1]**	
			Total	**Filtered**
BR	07/09/1998	0.5	<1.1 NJ	1.4 BNJ
JS	07/08/1998	23.0	<1.1 NJ	<1.1 NJ
JD	07/08/1998	2.6	<2.2 NJ	<2.2 NJ
NS	07/13/1998	4.0	**5.1 NJ**	<1.1 N
ND	07/13/1998	18.8	<1.1 NJ	<2.2 NJ
OS	07/13/1998	11.8	**476 NJ**	**6.8 NJ**
OD	07/14/1998	4.7	**<5.5 NJ**	**<11.0 NJ**
SS	07/10/1998	5.9	**<1.1 NJ**	**<2.2 NJ**
SD	07/09/1998	12.7	**25.6 NJ**	**24.0 NJ**
11	07/10/1998	7.7	**1.4 BNJ**	**<1.1NJ**
22	07/23/1998	0.4	**1.9 B**	**4.9**
23	07/23/1998	2.3	**1.6 B**	**1.5 B**
26	09/23/1998	NR	<11.0	**49.2BJ**
27	07/21/1998	5.0	**19.9**	**21.0**
28	07/21/1998	4.1	**15.4**	**13.0**
29	07/20/1998	3.3	3.0 B	1.4 B
30	07/20/1998	38	**37.4**	**36.8**
31	07/15/1998	45	<1.1	<2.2
32	07/15/1998	12.6	<1.1	<1.1
33	05/19/1999	32	**1.6 B**	<0.92
34	05/21/1999	1100	**8.6**	<0.92
Exxon MW-2	01/26/1999	<10	<1.0	<1.0
Monitoring Wells Screened in the First Confined Aquifer				
Monitoring Well	**Date Sampled**	**Turbidity (NTU)**	**Lead Concentration (ug/L)[1]**	
			Total	**Filtered**
12	07/08/1998	74.5	<1.1 N	<2.2 N
24	07/22/1998	22.2	<1.1	<1.1

Notes:

NTU = nephelometric turbidity units

[1] Laboratory results of groundwater samples analyzed by USEPA SOW ILM04.0.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-6

ANALYTICAL METHODS FOR ANALYSIS OF GROUNDWATER SAMPLES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Parameter	Method
Volatile Organic Compounds	Organic SOW OLC02.1
Total and Dissolved Lead and Cadmium	Inorganic SOW ILM04
Radiological Parameters	DOE EML HASL 300
General Chemistry	MCAWW[1]
pH	150.1
Bicarbonate Alkalinity	310.1
Carbonate Alkalinity	310.1
Chloride	325.2
Nitrate-Nitrite	353.2
Sulfate	375.4
Total Phosphorous	365.2
Total Dissolved Solids	160.1
Total Sulfide	376.1
Total Suspended Solids	160.2

Note:
[1] Methods for Chemical Analysis of Water and Waste

TABLE 7-7
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location	BR	JS	JD	NS	ND	OS
Sample Designation	(GWBR070998)	(GWJS070898)	(GWJD070898)	(GWNS071398)	(GWND071398)	(GWOS071398)
Date	07/09/1998	07/08/1998	07/08/1998	07/13/1998	07/13/1998	07/13/1998
Time	1616	1225	1050	1035	1220	1555
COMPOUND (ug/L)[1]						
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	<1.0	**0.13 J**	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acetone	< 69	< 43	< 43	< 29	< 6.7	<5.0
Carbon disulfide	<1.0	<1.0	<1.0	<1.0	<1.0	**0.25 J**
1,1-Dichloroethene	**11**	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	**9.2**	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	**0.24 J**	<1.0	**0.74 J**	<1.0	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	R	R	R	R	R	R
Bromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	**36 E**	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromdichloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	**0.22 J**	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	**1.1**	<1.0	<1.0	<1.0	**0.14 J**	**0.15 J**
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	**3.0**	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes (total)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	**0.24 J**	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	R	R	R	R	R	R
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:
(1) Laboratory results of groundwater samples analyzed using USEPA Method OLC02.1/SOW/10/92 and 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-7 (continued)
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
Phase II Groundwater Evaluation
NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Sample Location Sample Designation Date Time COMPOUND (ug/L)[1]	OD (GWOD071498) 07/14/1998 1012	SS (GWSS071098) 07/10/1998 1145	SD (GWSD070998) 07/09/1998 1105	11 (GW11071098) 07/10/1998 1115	22 (GW22072398) 07/23/1998 1040	23 (GW23072398) 07/23/1998 935
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acetone	< 5.0	< 38	< 83	< 59	<5.0J	R
Carbon disulfide	**0.44 J**	<1.0	**2.5**	<1.0	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0	<1.0	**0.12 J**	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	**0.22 J**	<1.0	**2.8**	**0.65 J**	**0.46 J**	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	R	R	**1.2 J**	R	R	R
Bromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	**0.70 J**	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromdichloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	<1.0	<1.0	**0.10 J**	**0.17 J**	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	**0.10 J**
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	**0.45 J**	<1.0	**0.19 J**	**0.13 J**	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	<1.0	<1.0	<1.0	**0.28 J**	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	**0.46 J**	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes (total)	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	R	R	R	R	R	R
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:
(1) Laboratory results of groundwater samples analyzed using USEPA Method OLC02.1/SOW/10/92 and 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-7 (continued)
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location	26	27	28	29	30	31
Sample Designation	(GW26092398)	(GW27072198)	(GW28072198)	(GW29072098)	(GW30072098)	(GW31071598)
Date	09/23/1998	07/21/1998	07/21/1998	07/20/1998	07/20/1998	07/15/1998
Time	1530	1050	1315	1020	1445	1552
COMPOUND (ug/L)[1]						
Chloromethane	<1.0UJ	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	<1.0UJ	<2.0	<2.0	<2.0	<2.0	<2.0
Acetone	R	<5.0J	<5.0J	<5.0 J	<5.0J	<5.0J
Carbon disulfide	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	**<1.0**	<1.0	**0.66 J**	<1.0	**0.64 J**	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	R	R	R	<5.0 J	R	<5.0J
Bromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromdichloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	**0.18 J**	<1.0	<1.0	**0.38 J**	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	**0.29 J**	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	R	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	R	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes (total)	<1.0	<1.0	**0.28 J**	<1.0	**0.11 J**	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	**0.18 J**
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	<1.0	R	R	R	R	R
1,2,4-Trichlorobenzene	**<1.0**	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

(1) Laboratory results of groundwater samples analyzed using USEPA Method OLC02.1/SOW/10/92 and 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-7 (continued)
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
Phase II Groundwater Evaluation
NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Sample Location	32	33	34	12	24	Exxon MW-2
Sample Designation	(GW32071598)	(GW33051999)	(GW34052199)	(GW12070898)	(GW24072298)	(GWEXXON012699)
Date	07/15/1998	05/19/1999	05/21/1999	07/08/1998	07/22/1998	01/26/1999
Time	1045	1350	1330	1614	1445	1200
COMPOUND (ug/L)[1]						
Chloromethane	**0.12 J**	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	<1.0	<1.0	<1.0	**13**	**4.1**	<1.0
Chloroethane	<1.0	<1.0UJ	<1.0	<1.0	<1.0	<1.0
Methylene chloride	<2.0	<2.0	**<2.0N**	<2.0	<2.0	<2.0
Acetone	<5.0 J	R	**<5.0UJ**	<38	<5.0J	3.3J
Carbon disulfide	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	**0.43 J**	**0.13 J**	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	**0.18 J**
trans-1,2-dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0UJ	**0.15 J**	<1.0	<1.0
2-Butanone	R	R	R	R	R	<5.0
Bromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromdichloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0	<1.0	**0.11 J**	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	<1.0	<1.0	<1.0	**0.28 J**	**0.64 J**	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0	<1.0	**0.38 J**	<1.0
4-Methyl-2-pentanone	<5.0	<5.0	<5.0UJ	<5.0	<5.0	<5.0
2-Hexanone	<5.0	<5.0	<5.0R	<5.0	<5.0	<5.0
Tetrachloroethene	<1.0	<1.0	<1.0UJ	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	**0.26 J**
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes (total)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	**0.32 J**	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	R	R	R	R	R	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0UJ	<1.0UJ	<1.0	<1.0	<1.0

Notes:

(1) Laboratory results of groundwater samples analyzed using USEPA Method OLC02.1/SOW/10/92 and 0LM01.9.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-8

CONCENTRATIONS OF GROSS RADIOLOGICAL PARAMETERS IN GROUNDWATER

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well	Sample Designation	Sample Date	Sample Time	Gross Alpha (pCi/L)(1)	Gross Beta (pCi/L)(1)
22	GW22072398	07/23/1998	1040	6.63 +/- 1.32	5.06 +/- 1.04
23	GW23072398	07/23/1998	935	4.70 +/- 1.25	9.66 +/- 1.69
24	GW24072298	07/22/1998	1445	1.85 +/- 0.80	3.64 +/- 1.27
26	GW26092398	09/23/1998	1530	0.43 +/- 1.17	1.70 +/- 1.29
27	GW27072198	07/21/1998	1050	0.51 +/- 0.77	16.0 +/- 2.0
28	GW28072198	07/21/1998	1315	51.4 +/- 7.0	106 +/- 11
29	GW29072098	07/20/1998	1020	1.46 +/- 1.03	6.06 +/- 1.48
30	GW30072098	07/20/1998	1445	9.47 +/- 2.75	12.8 +/- 3.0
31	GW31071598	07/15/1998	1552	280 +/- 29	109 +/- 11
32	GW32071598	07/15/1998	1045	2.67 +/- 0.92	8.68 +/- 1.58
33	GW33051999	05/19/1999	1350	1.28 +/- 3.16	12.1 +/- 3.3
34	GW24052199	05/21/1999	1330	1.81 +/- 2.36	1.14 +/- 5.50
Exxon MW-2	GWEXXON012699	01/26/1999	1200	1.15 +/- 1.04	7.25 +/- 1.68

Notes:
(1) Laboratory results of groundwater samples analyzed for gross alpha and gross beta using DOE EML HASL300.

TABLE 7-9

CONCENTRATIONS OF RADIOLOGICAL PARAMETERS IN GROUNDWATER

Phase II Groundwater Evaluation
NL Industries, Inc. Superfund Site
Pedricktown, New Jersey

Monitoring Well	Sample Designation	Sample Date	Sample Time	Gamma Spec Cesium - 137 (PCI/L)	Alpha Spec Thorium - 228 (PCI/L)	Alpha Spec Thorium - 230 (PCI/L)	Alpha Spec Thorium - 232 (PCI/L)	Alpha Spec Uranium - 234 (PCI/L)	Alpha Spec Uranium - 238 (PCI/L)	Alpha Spec Uranium - 235/236 (PCI/L)
22	GW22072398	07/23/1998	1040	<13.1						
23	GW22072398	07/23/1998	935	<16.4						
24	GW22072298	07/22/1998	1445	<14.7						
26	GW26092398	09/23/1998	1530	<16.1	0.93 +- 0.46	3.73 +- 1.15	0.11 +- 0.17	5.63 +- 1.79	5.90 +- 1.79	0.30 +- 0.34
27	GW27072198	07/21/1998	1050	<13.8	-0.20 +- 0.38	-0.13 +- 0.27	-0.29 +- 0.24	0.069 +- 0.103	0.010 +- 0.052	0.030 +- 0.091
28	GW28072198	07/21/1998	1315	<15.8	0.36 +- 0.20	0.45 +- 0.23	0.18 +- 0.16	2.17 +- 0.72	2.06 +- 0.70	0.35 +- 0.27
29	GW29072098	07/20/1998	1020	<16.3	0.24 +- 0.20	0.30 +- 0.21	0.096 +- 0.113	0.54 +- 0.31	0.17 +- 0.20	0.37 +- 0.12
30	GW30072098	07/20/1998	1445	<15.4	0.30 +- 0.26	0.54 +- 0.33	0.026 +- 0.172	3.52 +- 1.00	3.53 +- 1.01	0.22 +- 0.21
31	GW31071598	07/15/1998	1552	<18.2						
32	GW32071598	07/15/1998	1045	<15.9	0.12 +- 0.14	0.10 +- 0.17	0.027 +- 0.080	0.22 +- 0.20	0.023 +-0.080	0.23 +- 0.24
33	GW33051999	05/19/1999	1350	<12.8						
34	GW34052199	05/21/1999	1330	<13.3						
Exxon MW-2	GWEXXON012699	01/26/1999	1200	<18.8						

Notes:

(1) Laboratory results of groundwater samples analyzed using DOE EML HASL 300.
For a summary of USEPA laboratory analytical qualifiers, see Appendix F.

TABLE 7-10

GENERAL CHEMICAL ANALYSIS OF GROUNDWATER

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Location	**26**	**27**	**29**	**32**	**33**	**34**
Sample Designation	(GW26092398)	(GW27072198)	(GW29072098)	(GW32071598)	(GW33051999)	(GW34052199)
Date	09/23/1998	07/21/1998	07/20/1998	07/15/1998	05/19/1999	05/21/1999
Time	1530	1050	1020	1045		
ANALYTE (ug/L)						
Calcium	75900	160000	38300	20700	22700	22800
Iron	127000	3410	1750	1760	7260	99200
Magnesium	45300	6080	10100	8810	9320	11600
Manganese	3910	249	7820	290	2990	2730
Potassium	10900	24300	9990	8930	11000	8650
Sodium	189000	158000	454000	16900	311000	507000

Sample Location	**26**	**27**	**29**	**32**	**33**	**34**
Sample Designation	(GW26092398)	(GW27072198)	(GW29072098)	(GW32071598)	(GW33051999)	(GW34052199)
Date	09/23/1998	07/21/1998	07/20/1998	07/15/1998	05/19/1999	05/21/1999
Time	1530	1050	1020	1045	1350	1330
ANALYTE (mg/L)						
Bicarbonate Alkalinity	<5.0	11.8	298	NT	32.6	34.0
Carbonate Alkalinity	<5.0	<5.0	<5.0	NT	<5.0	<5.0
Chloride	27.4	14.0	63.6	NT	40.9	65.7
Nitrate-Nitrite	0.20	3.5	<0.20	NT	0.20	<0.20
Sulfate	2390	722	738	NT	721	1310
Total Phosphorus	0.037	<0.10	<0.10	NT	<0.10	0.77
Total Dissolved Solids	8390	1220	1520	NT	1080	1920
Total Sulfide	2.4	<0.50	<0.50	NT	<0.50	<0.50
Total Suspended Solids	<4.0	<4.0	6.4	NT	<4.0	700
pH (no units)	4.2	5.8	6.6	NT	5.7	7.0

NT = Not Tested

TABLE 7-11

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		1R			2R2					
Date		1983	1989 (filtered)	1997	1983	1988 (filtered)	1989	1989	1990	1997
Compound	Units									
Antimony	mg/l	NA	NA	<22.3	NA	<30	NA	NA	NA	23.1 B
Arsenic	mg/l	NA	NA	<3.2	NA	N/A	18200J	4900	4570	2,820
Beryllium	mg/l	NA	NA	<0.20 E	NA	NA	NA	NA	NA	0.73 B E
Cadmium	mg/l	NA	3 J	2.5 J B E	NA	2 J	<10	10	5	<4.6 J E
Chromium	mg/l	NA	NA	<3.2 J	NA	8 J	NA	NA	6	28.9
Copper	mg/l	NA	NA	2.9 B	NA	<20	NA	NA	NA	11.2 B
Lead	mg/l	280	<5 J	8.1	60	4	<1 J	<50	<5	<1.9 J
Mercury	mg/l	NA	NA	<0.20	NA	NA	NA	NA	NA	<0.20
Nickel	mg/l	NA	NA	10.8 B E	NA	NA	NA	NA	NA	15.2 B E
Selenium	mg/l	NA	NA	3.7 J B	NA	N/A	N/A	N/A	N/A	<3.1 J
Silver	mg/l	NA	NA	<3.3	NA	N/A	N/A	N/A	N/A	<3.3
Thallium	mg/l	NA	NA	<3.8 J N	NA	N/A	N/A	N/A	N/A	8.6 J B N
Zinc	mg/l	NA	NA	51.0	NA	N/A	N/A	N/A	N/A	21.5
Cyanide	mg/l	NA	NA	<5.0 J *	NA	N/A	N/A	N/A	N/A	13.2 J *
Sulfate	mg/l	8850	2,300	27	6500	3,340	5,800	6,100	2,300	4400
Turbidity	NTU	51	30	6.6	34	>90	>90	NA	NA	34
pH		4.61	4.1	5.1	6.96	6.6	8.7	NA	7.1	7.2
SC	mmho/cm	>8000	4400	100	>8000	5500	13000	9700	4200	1500
Gross Alpha	pCi/L	NA	NA	4.26/.66	NA	<20	<70	NA	<10	60.8/14.1
Gross Beta	pCi/L	NA	NA	2.62/.64	NA	<90	<100	NA	23/11	-15.7/ 9.8
Total VOCs	mg/l	NA	NA	ND	NA	NA	NA	NA	N/A	7.44

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		11					15			17		
Date		1983	1988 (filtered)	1989 (filtered)	1990	1997	1989 (filtered)	1990 (filtered)	1997	1989 (filtered)	1990* (filtered)	1997
Compound	Units											
Antimony	mg/l	NA	<3	NA	NA	28.7 J B	NA	NA	<14.0	NA	NA	<22.3
Arsenic	mg/l	NA	N/A	<3	NA	<3.2	<1 J	2	<2.3	6	2	15.0
Beryllium	mg/l	NA	3	NA	NA	0.37 B E	NA	NA	0.15 B	NA	NA	<0.20 E
Cadmium	mg/l	NA	134	210	NA	47.0 J E	<1	<3	<2.6 J	<1	<3	<2.3 J E
Chromium	mg/l	NA	5 J	NA	NA	4.7 B	N/A	5	<2.3	N/A	<5	9.2 B
Copper	mg/l	NA	42	NA	NA	16.5 B	NA	NA	1.8 J B	NA	NA	12.2 B
Lead	mg/l	460	6 J	N/A	NA	25.2 J	N/A	2.1	4.5	N/A	2.6	5.5 J
Mercury	mg/l	NA	<0.2	NA	NA	<0.20	NA	NA	<0.20	NA	NA	<0.20
Nickel	mg/l	NA	63	140 J	NA	17.1 B E	NA	NA	<8.4	NA	NA	<6.9 E
Selenium	mg/l	NA	N/A	NA	NA	4.8 J B	NA	NA	<3.0 J	NA	NA	<3.1 J
Silver	mg/l	NA	NA	NA	NA	<3.3	NA	NA	<2.4	NA	NA	<3.3
Thallium	mg/l	NA	1	NA	NA	4.0 J B N	NA	NA	3.6 B	NA	NA	6.2 J B N
Zinc	mg/l	NA	297	NA	NA	59.2	NA	NA	13.9 B	NA	NA	62.1
Cyanide	mg/l	NA	NA	NA	NA	<5.0 J *	NA	NA	<5.0 J	NA	NA	<5.0 J *
Sulfate	mg/l	14700	2,760	1,800	NA	4600	22	15	17	13	10	10
Turbidity	NTU	15	53	NA	NA	16	NA	8.7	3	NA	10	46
pH		4.79	5.2	5.7	NA	6.1	5.2	4.7	5.2	7	5.1	5.4
SC	mmho/cm	>8000	4500	4100	NA	1800	110	100	10	40	100	100
Gross Alpha	pCi/L	NA	<10	<40	NA	10/7.8	<1	NA	.36/.21	1/.4	NA	4.17/.6
Gross Beta	pCi/L	NA	<50	NA	NA	27.3/7.6	4.5/1.3	NA	1.85/.83	2.1/.4	NA	5.4/.79
Total VOCs	mg/l	NA	NA	5124	2974	1.52	NA	NA	ND	NA	NA	1.9

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

ME0015/MD99690.XLS

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		BR					CR2			HS			
Date		1983	1988	1988 (filtered)	1990	1997	1983	1988 (filtered)	1997	1983	1988 (filtered)	1989 (filtered)	1997
Compound	**Units**												
Antimony	mg/l	NA	<3	NA	NA	<22.3	NA	<3	<14.0	NA	122	92 J	<14.0
Arsenic	mg/l	NA	<1	NA	NA	<3.2 J	NA	<1	<2.3	NA	2	NA	<2.3
Beryllium	mg/l	NA	NA	NA	NA	<0.20 E	NA	NA	<0.12	NA	NA	NA	2.3 B
Cadmium	mg/l	NA	15	<1 J	NA	13.5 E	NA	<1	<2.6 J	NA	10 J	6.3 J	14.6 J
Chromium	mg/l	NA	2 J	NA	NA	<3.2	NA	10	3.1 B	NA	3 J	NA	7.6 B
Copper	mg/l	NA	39	NA	NA	5.8 B	NA	<20	<1.5	NA	24	NA	42.9
Lead	mg/l	250	18	5 J	NA	1.9 B	70	28 J	1.8 B	3860	6,290 J	4,400	90.2
Mercury	mg/l	NA	NA	NA	NA	<0.20	NA	NA	<0.20	NA	NA	NA	<0.20
Nickel	mg/l	NA	NA	NA	NA	9.0 B E	NA	NA	<8.4	NA	NA	NA	19.8 J B
Selenium	mg/l	NA	<20	NA	NA	<3.1	NA	<2	<3.0 J	NA	<2	NA	<3.0 J
Silver	mg/l	NA	NA	NA	NA	<3.3	NA	NA	<2.4	NA	NA	NA	<2.4
Thallium	mg/l	NA	NA	NA	NA	6.8 J B N	NA	NA	3.3 B	NA	NA	NA	2.8 B
Zinc	mg/l	NA	NA	NA	NA	25.7	NA	NA	15.7 J B	NA	NA	NA	109 J
Cyanide	mg/l	NA	NA	NA	NA	<5.0 J *	NA	NA	<5.0 J	NA	NA	NA	<5.0 J
Sulfate	mg/l	11400	1,100	89 J	NA	3700	23	4	<5	186	84	69 J	110
Turbidity	NTU	3	1.5	NA	NA	4	125	>90	24	24	>90	>90	0.4
pH		5.42	5.7	4.1	NA	6.2	5.97	5.7	5.9	3.36	3.8	4.4	3.6
SC	mmho/cm	>8000	2000	310	NA	1700	140	110	30	8000	300	220	300
Gross Alpha	pCi/L	NA	<8	3.6/1.2	NA	8.32/6.92	NA	<1	.53/.29	NA	<3	NA	5.25/.78
Gross Beta	pCi/L	NA	<20	NA	NA	34.1/8.1	NA	<2	1/.49	NA	9.3/6	NA	11.6/1.3
Total VOCs	mg/l	NA	NA	NA	89.3	79	NA	NA	ND	NA	NA	NA	ND

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

ME0015/MD99690.XLS

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		JD			KS			KD					LS
Date		1983	1988 (filtered)	1997	1983	1988 (filtered)	1997	1983	1988 (filtered)	1989 (filtered)	1990	1997	1997
Compound	Units												
Antimony	mg/l	NA	<30	<14.0	NA	<30	85.4	NA	<30 J	NA	NA	<14.0	<22.3
Arsenic	mg/l	NA	1	<4.6	NA	N/A	4.6 B	NA	N/A	NA	21	<2.3	24.5
Beryllium	mg/l	NA	7	7.9	NA	NA	0.29 B	NA	NA	NA	NA	0.81 J B	<0.20 E
Cadmium	mg/l	NA	103	193 J	NA	173	63.0 J	NA	291	113	103	16.5 J	<2.3 J E
Chromium	mg/l	NA	27	45.2	NA	60	<2.3	NA	246	81 J	82	<2.3	<3.2
Copper	mg/l	NA	143	300	NA	219	5.6 B	NA	513	152 J	NA	22.1 J B	2.8 B
Lead	mg/l	390	14	4.1 B	2560	3130	328	270	61J	19 J	14	<1.0	31.7
Mercury	mg/l	NA	<0.2	<0.20	NA	NA	<0.20	NA	NA	NA	NA	<0.20	<0.20
Nickel	mg/l	NA	99	146	NA	NA	123	NA	NA	NA	NA	537	<6.9 E
Selenium	mg/l	NA	<20	<6.0 J	NA	N/A	<3.0	NA	N/A	NA	NA	<3.0	4.7 J B
Silver	mg/l	NA	<10	<2.4	NA	NA	<2.4	NA	NA	NA	NA	<2.4	<3.3
Thallium	mg/l	NA	<1	8.7 B	NA	NA	5.4 J B	NA	NA	NA	NA	9.7 J B	<3.8 J N
Zinc	mg/l	NA	603	1,070	NA	NA	2,350	NA	NA	NA	NA	10,600	25.5 J
Cyanide	mg/l	NA	<10	<5.0 J	NA	NA	<5.0 J	NA	NA	NA	NA	<5.0 J	<5.0 J *
Sulfate	mg/l	3520	741	1500	6000	3,070	680	11,000	8,460	2,700	5,700	2400	61
Turbidity	NTU	46	44	3	17	>90	5	300	>90	NA	3.7	0.4	7
pH		3.3	4	3.6	2.59	2.9	5.1	2.55	2.5	3.4	3.2	3.7	5.5
SC	mmho/cm	6000	510	1200	>8000	5000	1000	>8000	12000	500	1000	2100	200
Gross Alpha	pCi/L	NA	<8	15.7/2.8	NA	<10	1.64/1.13	NA	43/26	NA	57/21	10.7/9.9	13.2/1.7
Gross Beta	pCi/L	NA	<20	11.5/2.1	NA	<60	5.68/1.22	NA	<100	NA	<20	5.32/5.01	5.48/.79
Total VOCs	mg/l	NA	NA	0.27	NA	NA	ND	NA	NA	NA	N/A	0.34	0.43

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		LD				MS			
Date		1983	1988 (filtered)	1989	1997	1983	1988 (filtered)	1989 (filtered)	1997
Compound	Units								
Antimony	mg/l	NA	<30	NA	92.4	NA	<3 J	NA	30.3 B
Arsenic	mg/l	NA	2	NA	9.9 B	NA	<1	NA	<3.2
Beryllium	mg/l	NA	NA	NA	1.5 B E	NA	NA	NA	<0.20 E
Cadmium	mg/l	NA	2 J	2	3.1 J B E	NA	11	16 J	<2.3 J E
Chromium	mg/l	NA	11	NA	3.4 B	NA	4J	NA	8.5 B
Copper	mg/l	NA	<20	NA	8.3 B	NA	<20	NA	12.7 B
Lead	mg/l	290	44	24	16.2	740	198 J	219 J	102
Mercury	mg/l	NA	NA	NA	<0.20	NA	NA	NA	<0.20
Nickel	mg/l	NA	NA	NA	21.0 J B E	NA	NA	NA	20.6 B E
Selenium	mg/l	NA	<20	NA	<3.1	NA	<20	NA	<3.1
Silver	mg/l	NA	NA	NA	<3.3	NA	NA	NA	<3.3
Thallium	mg/l	NA	NA	NA	4.4 J B N	NA	NA	NA	<3.8 J N
Zinc	mg/l	NA	NA	NA	236	NA	NA	NA	54.8
Cyanide	mg/l	NA	NA	NA	<5.0 J *	NA	NA	NA	<5.0 *
Sulfate	mg/l	289	170	41	260	1080	321	N/A	41
Turbidity	NTU	45	>5	2.7	19	58	46	22	34
pH		4.42	4	3.5	4.5	4.51	4	4.1	5.8
SC	mmho/cm	700	340	120	300	2300	700	700	300
Gross Alpha	pCi/L	NA	<4	NA	4.09/.79	NA	<4	NA	.82/.665
Gross Beta	pCi/L	NA	7.6/3.7	NA	6.36/.88	NA	<9	NA	2.68/.58
Total VOCs	mg/l	NA	NA	NA	0.10	NA	NA	NA	0.13

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		NS				SD					10R	
Date		1983	1988 (filtered)	1989 (filtered)	1997	1983	1988 (filtered)	1989 (filtered)	1990 (filtered)	1997	1990 (filtered)	1997
Compound	Units											
Antimony	mg/l	NA	<30	NA	<22.3 J	NA	<30	NA	NA	31.9 B	NA	<14.0
Arsenic	mg/l	NA	<1	NA	<3.2	NA	N/A	N/A	29	<25.6	3	<23.2
Beryllium	mg/l	NA	NA	NA	0.46 B E	NA	NA	NA	NA	32.6 J E	NA	14.4
Cadmium	mg/l	NA	9	4	<2.3 J E	NA	1,010	963	997	237 J E	<3	33.9 J
Chromium	mg/l	NA	13	NA	<3.2	NA	3,250	4,340 J	3,660	591	5	<2.3
Copper	mg/l	NA	<20	NA	3.8 B	NA	3,840	4,680 J	NA	791	NA	42.8
Lead	mg/l	1180	45 J	10 J	8.2	2960	294	84 J	56	51.1 J	90	26.1 B
Mercury	mg/l	NA	NA	NA	<0.20	NA	0.3	NA	NA	<0.20	NA	<0.20
Nickel	mg/l	NA	NA	NA	<6.9 E	NA	1930	2480	NA	511 J E	NA	156
Selenium	mg/l	NA	<20	NA	<3.1	NA	N/A	NA	NA	<24.8	NA	<29.9 J
Silver	mg/l	NA	NA	NA	<3.3	NA	44	37	NA	<3.3	NA	<2.4
Thallium	mg/l	NA	NA	NA	4.1 J B N	NA	3	NA	NA	42.1 J B N	NA	<27.2 J
Zinc	mg/l	NA	NA	NA	37.9 J	NA	8640	9690	NA	2,450	NA	1,510
Cyanide	mg/l	NA	NA	NA	<5.0 J *	NA	<10	NA	NA	13.9 J *	NA	<5.0 J
Sulfate	mg/l	466	367	200	80	26800	NA	24,000	25,000	27,000	510	1300
Turbidity	NTU	400	19	>90	67	180	>90	NA	>90	31	NA	0.6
pH		4.04	3.6	3.9	6	2.15	3.7	2.3	2.5	2.9	7.2	4
SC	mmho/cm	1050	710	4800	40	>8000	20000	24000	10000	27400	1100	1900
Gross Alpha	pCi/L	NA	<3	NA	1.48/.54	NA	260/110	570/180	13/10	85.3/42.2	<4	6.1/1.28
Gross Beta	pCi/L	NA	<10	NA	3.28/.63	NA	420/210	580/170	21/5	152/46	9.8/1.5	18.7/2.2
Total VOCs	mg/l	NA	NA	NA	ND	NA	NA	6	13	20	N/A	0.88

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

ME0015/MD99690.XLS

TABLE 7-11 (continued)

HISTORICAL GROUNDWATER DATA

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well		12				20	
	Date	1988 (filtered)	1989 (filtered)	1990 (filtered)	1997	1990 (filtered)	1997
Compound	Units						
Antimony	mg/l	<30	NA	NA	14.7 B	NA	<22.3 J
Arsenic	mg/l	2	NA	2.3	<2.3	4	<16.0
Beryllium	mg/l	NA	NA	NA	<0.12	NA	0.30 B E
Cadmium	mg/l	<1	<1	NA	<2.6 J	<3	7.8 J E
Chromium	mg/l	1 J	NA	NA	<2.3	<5	<3.2
Copper	mg/l	<20	NA	NA	<1.5	NA	<1.6
Lead	mg/l	27 J	N/A	2.3	<1.0	1.1	<9.5
Mercury	mg/l	NA	NA	NA	<0.20	NA	<0.20
Nickel	mg/l	NA	NA	NA	16.8 B	NA	74.2 J E
Selenium	mg/l	<2	NA	NA	<3.0 J	NA	<15.5
Silver	mg/l	NA	NA	NA	<2.4	NA	4.3 B
Thallium	mg/l	NA	NA	NA	5.3 B	NA	<19.0 J N
Zinc	mg/l	NA	NA	NA	36.1	NA	250
Cyanide	mg/l	NA	NA	NA	<5.0 J	NA	<5.0 J *
Sulfate	mg/l	4	<1	1	79	830	2700
Turbidity	NTU	13	27	NA	19	NA	41
pH		8	5.7	8.1	5.6	9.4	5.6
SC	mmho/cm	5.2	125	100	500	2100	1000
Gross Alpha	pCi/L	<2	NA	NA	2.95/.74	<2	12.4/5.2
Gross Beta	pCi/L	2.6/1.6	NA	NA	4.76/.74	49/2	11.3/4.3
Total VOCs	mg/l	NA	NA	N/A	11.30	NA	11.5

Notes:
For a summary of USEPA qualifers, see Appendix F.
NA = Not Analyzed
N/A = Data Not Available
ND = Not Detected

TABLE 7-12

CONCENTRATION OF CONSTITUENTS EXCEEDING REMEDIAL ACTION OBJECTIVES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Compund	Monitoring Well Date / Remedial Action Objective	BR 07/09/1998	JS 07/08/1998	JD 07/08/1998	NS 07/13/1998	ND 07/13/1998	OD 07/14/1998
Vinyl Chloride	2 (1)						
1,1-Dichloroethene	2 (2)	11					
1,1-Dichloroethane	70 (1)						
Chloroform	6 (1)						
1,1,1-Trichloroethane	26 (3)	36 E					
1,2-Dichloropropane	1 (2)						
Tetrachloroethene	1 (2)						
Toluene	1,000 (1)						
Ethylbenzene	700 (1)						
Xylenes (total)	40 (1)						
Bis-(2-ethylhexyl)phthalate)	30 (2)						
N-Nitroso-di-n-propylamine	20 (2)						
Antimony	20 (2)						
Arsenic (total)	8 (2)						
Beryllium	20 (2)						
Cadmium	4 (1)	16.0		200			
Chromium (total)	100 (1)						
Copper	1,000 (1)						
Cyanide	200 (1)						
Lead (total)	10 (2)						
Mercury (total)	2 (1)						
Nickel (soluble salts)	100 (1)						
Selenium (total)	50 (1)						
Thallium	10 (2)						
Zinc	5,000 (1)						
Gross Alpha (PC/L)	15 (1)						
Gross Beta (pC/L)	4 (1)						

Notes:

Concentrations for each constituent are reported as ug/L, except for gross alpha and gross beta, which are reported as pCi/L.

Note that the RAO for gross beta is 4 millirem/year.

(1) = New Jersey Ground Water Quality Standard (NJGWQS) (N.J.A.C. 7:9-6)

(2) = Practical Quantitation Level (PQL)

(3) = New Jersey Maximum Contaminant Level (NJMCL) (N.J.A.C. 7:10-16.7)

TABLE 7-12 (continued)

CONCENTRATIONS OF CONSTITUENTS EXCEEDING REMEDIAL ACTION OBJECTIVES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well / Date		OS 09/24/1998	SS 07/10/1998	SD 07/09/1998	11 07/10/1998	12 07/10/1998	24 07/22/1998
Compound	Constituent Standard (ug/L)						
Vinyl Chloride	2[1]					13	4.1
1,1-Dichloroethene	2[2]						
1,1-Dichloroethane	70[1]						
Chloroform	6[1]						
1,1,1-Trichloroethane	26[3]						
1,2-Dichloropropane	1[2]						
Tetrachloroethene	1[2]						
Toluene	1,000[1]						
Ethylbenzene	700[1]						
Xylenes (total)	40[1]						
Bis-(2-ethylhexyl)phthalate)	30[2]						
N-Nitroso-di-n-propylamine	20[2]						
Antimony	20[2]						
Arsenic (total)	8[2]						
Beryllium	20[2]						
Cadmium	4[1]		22.7	184	240		
Chromium (total)	100[1]						
Copper	1,000[1]						
Cyanide	200[1]						
Lead (total)	10[2]	281					
Mercury (total)	2[1]						
Nickel (soluble salts)	100[1]						
Selenium (total)	50[1]						
Thallium	10[2]						
Zinc	5,000[1]						
Gross Alpha (PC/L)	15[1]						
Gross Beta (pC/L)	4[1]						

Notes:

Concentrations for each constituent are reported as ug/L, except for gross alpha and gross be (2) = Practical Quantitation Level (PQL)

Note that the RAO for gross beta is 4 millirem/year.

(1) = New Jersey Ground Water Quality Standard (NJGWQS) (N.J.A.C. 7:9-6)

(2) = Practical Quantitation Level (PQL)

(3) = New Jersey Maximum Contaminant Level (NJMCL) (N.J.A.C. 7:10-16.7)

TABLE 7- (continued)

CONCENTRATIONS OF CONSTITUENTS EXCEEDING REMEDIAL ACTION OBJECTIVES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Monitoring Well / Date		22 07/23/1998	23 07/23/1998	26 09/23/1998	27 07/21/1998	28 07/21/1998	29 07/20/1998
Compund	Constituent Standard (ug/L)						
Vinyl Chloride	2 [1]						
1,1-Dichloroethene	2 [2]						
1,1-Dichloroethane	70 [1]						
Chloroform	6 [1]						
1,1,1-Trichloroethane	26 [3]						
1,2-Dichloropropane	1 [2]						
Tetrachloroethene	1 [2]						
Toluene	1,000 [1]						
Ethylbenzene	700 [1]						
Xylenes (total)	40 [1]						
Bis-(2-ethylhexyl)phthalate)	30 [2]						
N-Nitroso-di-n-propylamine	20 [2]						
Antimony	20 [2]						
Arsenic (total)	8 [2]						
Beryllium	20 [2]						
Cadmium	4 [1]	92	12.9		14.8	383	
Chromium (total)	100 [1]						
Copper	1,000 [1]						
Cyanide	200 [1]						
Lead (total)	10 [2]				19.9	15.4	
Mercury (total)	2 [1]						
Nickel (soluble salts)	100 [1]						
Selenium (total)	50 [1]						
Thallium	10 [2]						
Zinc	5,000 [1]						
Gross Alpha (PC/L)	15 [1]					51.4+/-7.0	
Gross Beta (pC/L)	4 [1]	5.06 +/-1.04	9.66+/-1.69			106+/-11	6.06+/-1.48

Notes:
Concentrations for each constituent are reported as ug/L, except for gross alpha and gross beta, which are reported as pCi/L.
Note that the RAO for gross beta is 4 millirem/year.
(1) = New Jersey Ground Water Quality Standard (NJGWQS) (N.J.A.C. 7:9-6)
(2) = Practical Quantitation Level (PQL)
(3) = New Jersey Maximum Contaminant Level (NJMCL) (N.J.A.C. 7:10-16.7)

TABLE 7-[illegible] (continued)

CONCENTRATIONS OF CONSTITUENTS EXCEEDING REMEDIAL ACTION OBJECTIVES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

	Monitoring Well / Date	30 07/20/1998	31 07/15/1998	32 07/15/1998	33 05/19/1998	34 05/21/1999	EXXON-2 01/26/1999
Compund	**Constituent Standard (ug/L)**						
Vinyl Chloride	2 (1)						
1,1-Dichloroethene	2 (2)						
1,1-Dichloroethane	70 (1)						
Chloroform	6 (1)						
1,1,1-Trichloroethane	26 (3)						
1,2-Dichloropropane	1 (2)						
Tetrachloroethene	1 (2)						
Toluene	1,000 (1)						
Ethylbenzene	700 (1)						
Xylenes (total)	40 (1)						
Bis-(2-ethylhexyl)phthalate)	30 (2)						
N-Nitroso-di-n-propylamine	20 (2)						
Antimony	20 (2)						
Arsenic (total)	8 (2)						
Beryllium	20 (2)						
Cadmium	4 (1)	327					
Chromium (total)	100 (1)						
Copper	1,000 (1)						
Cyanide	200 (1)						
Lead (total)	10 (2)	37.4					
Mercury (total)	2 (1)						
Nickel (soluble salts)	100 (1)						
Selenium (total)	50 (1)						
Thallium	10 (2)						
Zinc	5,000 (1)						
Gross Alpha (PC/L)	15 (1)		280+/-29				
Gross Beta (pC/L)	4 (1)	12.8+/-3.0	109+/-11	8.68+/-1.58	12.1+/-3.3		7.25+/-1.68

Notes:

Concentrations for each constituent are reported as ug/L, except for gross alpha and gross beta, which are reported as pCi/L.

Note that the RAO for gross beta is 4 millirem/year.

(1) = New Jersey Ground Water Quality Standard (NJGWQS) (N.J.A.C. 7:9-6)

(2) = Practical Quantitation Level (PQL)

(3) = New Jersey Maximum Contaminant Level (NJMCL) (N.J.A.C. 7:10-16.7)

TABLE 8-1

CONCENTRATIONS OF LEAD AND CADMIUM IN PRIVATE WELL SAMPLES

Phase II Groundwater Investigation
NL Industries Superfund Site
Pedricktown, New Jersey

Well	Sample Date	Lead Concentration (ug/L)[1]		Cadmium Concentration (ug/L)[1]	
		Total	Filtered	Total	Filtered
Butcher	01/26/1999	**4.6**	<1.0	<0.30	<0.30
Cassano	07/23/1998	**12.6**	<1.1	<0.40	<0.40
CCC [2]	07/10/1998	<1.1 NJ	<1.1 NJ	<0.40	**0.44 B**
Cruz [2]	07/10/1998	**15.5 NJ**	<1.1 NJ	<0.40	**0.54 B**
Eyler [3]	07/24/1998	**26.5**	**27.4**	**0.82 B**	**0.79 B**
Eyler	01/26/1999	**10.5**	**4.2**	**0.86 B**	**0.81 B**
Gates	07/14/1998	<2.2	<5.5	<0.40	<0.40
Kinney [2]	07/14/1998	<1.1 NJ	<1.1 NJ	<0.40	**0.71 B**
McCourt	07/22/1998	<1.1	**3.0 B**	**0.56 B**	**0.67 B**
Wistar [2]	07/13/1998	**6.9 NJ**	**2.8 BNJ**	**0.41 B**	**0.52 B**

Notes:
[1] Laboratory results of groundwater samples analyzed by USEPA SOW ILM04.0; for a summary of USEPA laboratory analytical qualifiers, See Appendix F.
[2] The lead concentrations reported for this sample are the results obtained from a redigestion and analysis of the sample in a new batch; the original results were rejected because of a quality control outlier within the initial analytical batch.
[3] Due to an inadequate purge of the well and associated piping, the sample results are not believed to be representative.

TABLE 9-1

GROUNDWATER LEVELS PRIOR TO AND AFTER COMPLETION OF THE PUMPING TEST

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

PRE-TEST GROUNDWATER ELEVATIONS 6/7/99 BETWEEN 1300 AND 1400 HRS.				PUMPING-TEST GROUNDWATER ELEVATIONS 6/10/99 BETWEEN 1300 AND 1400 HRS.				DIFFERENCE	DRAWDOWN
WELL	TOC (ft)	DTW (ft)	GW ELEV (ft)	WELL	TOC (ft)	DTW (ft)	GW ELEV (ft)	(ft)	(ft)
SD	13.39	7.15	6.24	SD	13.39	8.17	5.22	1.02	1.02
SS	12.7	6.11	6.59	SS	12.7	7.01	5.69	0.9	0.9
S4-1*	12	5.2	6.8	S4-1*	12	6.2	5.8	1	1
T2-3	11.34	6.76	4.58	T2-3	11.34	7.02	4.32	0.26	--
TC	--	7.25	--	TC	--	7.55	--	--	--
T-4	12.12	7.31	4.81	T-4	12.12	7.66	4.46	0.35	--
T-A	--	7.58	--	T-A	--	7.96	--	--	--
OS	11.95	7.63	4.32	OS	11.95	7.96	3.99	0.33	--
OD	12.47	8.33	4.14	OD	12.47	8.58	3.89	0.25	--
11	11.19	5.41	5.78	11	11.19	5.6	5.59	0.19	--
PD	12.86	6.85	6.01	PD	12.86	7.09	5.77	0.24	--
BR	10.82	5.5	5.32	BR	10.82	5.74	5.08	0.24	--
PS	11.89	5.72	6.17	PS	11.89	5.96	5.93	0.24	--
PW	11.55	6.18	5.37	PW	11.55	14.5	-2.95	8.32	8.32
OW	11.83	6.49	5.34	OW	11.83	9.51	2.32	3.02	3.02
KS	11.54	6.04	5.5	KS	11.54	8.77	2.77	2.73	2.73
KD	11.77	6.27	5.5	KD	11.77	9.27	2.5	3	3
24	13.04	17.56	-4.52	24	13.04	17.92	-4.88	0.36	--
JD	14.02	7.48	6.54	JD	14.02	7.91	6.11	0.43	--
JS	13.89	7.38	6.51	JS	13.89	7.82	6.07	0.44	--
10R	14.02	17.31	-3.29	10R	14.02	17.67	-3.65	0.36	--
ID	17.18	10.55	6.63	ID	17.18	10.83	6.35	0.28	--
IS	17.35	8.19	9.16	IS	17.35	8.43	8.92	0.24	--
HD	18.67	13.65	5.02	HD	18.67	13.89	4.78	0.24	--
HS	18.4	13.8	4.6	HS	18.4	14.03	4.37	0.23	--
28	16.4	10.92	5.48	28	16.4	11.96	4.44	1.04	1.04
27	16.57	11.07	5.5	27	16.57	12.03	4.54	0.96	0.96
30	16.29	11.13	5.16	30	16.29	11.36	4.93	0.23	--
29	16.26	10.79	5.47	29	16.26	11.1	5.16	0.31	--
32	14.28	9.77	4.51	32	14.28	9.97	4.31	0.2	--
31	14.33	9.21	5.12	31	14.33	9.4	4.93	0.19	--
RD	15.56	9.58	5.98	RD	15.56	9.77	5.79	0.19	--
RS	15.4	7.42	7.98	RS	15.18	7.57	7.61	0.37	--

Notes:

1) TOC for Wells PW, OW, OS, OD, KS, KD, HS, HD, SS, T-4, RS, RD, PS, 24, 28, 27, 30, 29, 32, and 31 adjusted by adding 1.12 feet to convert from NAVD 1988 to NGVD 1929
2) Shaded cells denote wells used in construction of shallow potentiometric surface maps and flow model
3) Water-level differences less than 0.9 feet are attributed to the natural decline of the water table during the 1999 drought and do not represent drawdown

* TOC is estimated

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TABLE 9-2

SUMMARY OF GROUNDWATER pH and TURBIDITY[1] DURING AQUIFER TEST

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Designation	Date	Time	Turbidity[2]	pH [3]
PT-1-060799	06/07/1999	1500	1.40	3.23
PT-2-060799	06/07/1999	1537	0.60	3.11
PT-3-060799	06/07/1999	1630	NT	3.58
PT-4-060799	06/07/1999	1730	0.85	3.15
PT-5-060899	06/08/1999	130	0.30	3.69
PT-6-060899	06/08/1999	930	0.67	3.41
PT-7-060899	06/08/1999	1720	0.86	3.2
PT-8-060999	06/09/1999	1330	0.94	2.94
PT-9-060999	06/09/1999	1020	0.87	3.32
PT-10-060999	06/09/1999	1750	0.92	3.25
PT-11-061099	06/10/1999	130	0.00	3.11
PT-12-061099	06/10/1999	930	1.38	3.28
PT-13-061099	06/10/1999	1415	1.90	3.15

TABLE 9-3

SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED DURING AQUIFER TEST

Phase II Groundwater Evaluation
NL Industies Superfund Site
Pedricktown, New Jersey

Sample Designation	Date	Time	Chloroform, ug/L	Toluene, ug/L
PT-1-060799	06/07/1999	1500	0.23 J	0.17 J
PT-8-060999	06/09/1999	1330	0.25 J	0.25 J
PT-13-061099	06/10/1999	1415	0.19 J	ND
TRIP BLANK	06/09/1999	NA	ND	ND
TRIP BLANK	06/10/1999	NA	ND	ND
QA/QC Samples				
QA-1	06/10/1999	NA	ND	ND
PT-ERB-060799	06/07/1999	930	ND	ND

Notes:
J - estimated concentration below reporting limit
ND - Not detected above the method detection limit
NA - Not applicable

TABLE 9-4

SUMMARY OF LEAD AND CADMIUM IN GROUNDWATER EXTRACTED DURING AQUIFER TEST

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample Designation	Date	Time	Total Lead	Dissolved Lead	Total Cadmium	Dissolved Cadmium
PT-1-060799	06/07/1999	1500	6.1	4.6	43.9	45.2
PT-2-060799	06/07/1999	1537	3.0	1.4B	45.7	46.3
PT-3-060799	06/07/1999	1630	1.7B	ND	47.8	48.3
PT-4-060799	06/07/1999	1730	2.7B	ND	46.2	46.1
PT-5-060899	06/08/1999	0130	6.6	ND	44.8	43.9
PT-6-060899	06/08/1999	930	2.2B	ND	42.9	42.9
PT-7-060899	06/08/1999	1720	1.6B	ND	42.2	41.5
PT-8-060999	06/09/1999	0130	9.3	5.3	41.0	38.7
PT-9-060999	06/09/1999	1020	3.4	ND	39.2	38.9
PT-10-060999	06/09/1999	1750	2.9B	ND	39.0	38.2
PT-11-061099	06/10/1999	0130	ND	ND	38.0	37.9
PT-12-061099	06/10/1999	930	7.0	1.5B	36.8	37.2
PT-13-061099	06/10/1999	1415	1.7B	1.2B	37.3	35.3
QA/QC Samples						
PT-DUPLICATE-061099	06/09/1999	--	ND	ND	36.4	36.2
QA-1	06/10/1999	--	4.5	ND	36.5	35.0
PT-ERB-060799	06/07/1999	930	5.5	0.94B	0.85B	ND

Notes:
(1) Measurements obtained using portable field instruments
(2) Turbidity reported in nephelometric turbidity units (NTUs)
(3) pH reported in standard units (SU)
(4) All concentrations in ug/L (ppb)

TABLE 9-5

SUMMARY OF GENERAL GROUNDWATER CHEMISTRY(1) DURING AQUIFER TEST

Phase II Groundwater Evaluation
NL Industies Superfund Site
Pedricktown, New Jersey

Sample Designation	Date	Time	Bicorbonate Alkalinity	Carbonate Alkalinity	Chloride	Sulfate
PT-1-060799	06/07/1999	1500	ND	ND	53.4	3750
PT-8-060999	06/09/1999	1330	ND	ND	46.4	3200
PT-13-061099	06/10/1999	1415	ND	ND	40	2920
QA/QC Samples						
QA-1(2)	06/10/1999	1420	ND	ND	40.3	2780
PT-ERB-060799(3)	06/07/1999	930	13.2	ND	4.9	1.2

Sample Designation	Date	Time	Total Phosphorous	Total Dissolved Solids	Total Suspended Solids
PT-1-060799	06/07/1999	1500	ND	5260	6.4
PT-8-060999	06/09/1999	1330	ND	4300	ND
PT-13-061099	06/10/1999	1415	ND	3780	ND
QA/QC Samples					
QA-1(2)	06/10/1999	1420	ND	3720	ND
PT-ERB-060799(3)	06/07/1999	930	0.12	153	ND

Notes:
1 - Results reported in milligrams per liter (mg/L)
2 - Blind duplicate sample of PT-13-061099
3 - Equipment rinsate blank sample

TABLE 9-6

ESTIMATED PERFORMANCE OF PUMP AND TREAT TECHNIQUE

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

From mass calculations (Table 2-1): Mass of lead in groundwater = 9 lbs
Mass of cadmium in groundwater = 14 lbs

From Capture Zone Evaluation (Section 12): Estimate average total groundwater extraction rate = 37 gpm = 0.05 mgd

Time required to extract lead (if possible): .001 mg/L*8.34*0.05 mgd = 0.0004 lbs of lead per day extracted

$$\frac{9 \text{ lbs}}{0.0004 \text{ lbs/d}} = 225 \text{ days} = 61 \text{ years (if possible)}$$

Time required to extract cadmium (if possible): .002 mg/L * 8.34 x 0.05 mgd = 0.0008 lbs of cadmium per day extracted

$$\frac{14 \text{ lbs}}{0.0008 \text{ lbs/d}} = 17{,}500 \text{ days} = 48 \text{ years (if possible)}$$

Note: Concentrations of lead and cadmium in extracted groundwater are expected to be non-detectable at steady state. Therefore, assume average concentrations of lead in extracted groundwater to be 1 ppb. For cadmium, assume the concentration will be up to 2 ppb to be conservative. It is possible that the concentrations of lead and cadmium in extracted groundwater will be lower than estimated.

TABLE 11-1

MINERAL ANALYSIS BY X-RAY DIFFRACTION

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

	Whole Rock Composition (weight %)										Relative Clay Abundance (Normalized to 100%)				
Sample ID	**Quartz**	**K feldspar**	**Plagioclase**	**Calcite**	**Dolomite**	**Siderite**	**Pyrite**	**Pb phosphate**	**Hematite**	**Total Clays**	**Illite/Mica**	**Kaolinite**	**Chlorite**	**Smectite**	**Illite/Smectite**
SO2910-16 7/15/98	83	3	2	0	1	0	0	0	Tr	*11*	22	78	0	0	0
SV2812-16-7/16/98	96	1	1	0	Tr	0	0	Tr	0	*2*	40	60	0	0	0
SV26 2/20/98	99	0	Tr	0	Tr	0	0	0	0	*1*	31	69	0	0	0
SV-40	96	0	Tr	0	1	0	0	Tr	0	*3*	36	64	0	0	0

TABLE 11-2

SUMMARY OF LEAD AND CADMIUM SOIL CONCENTRATIONS AND THEIR SOIL PHASE ASSOCIATIONS

Phase II Groundwater Evaluation
NL Industies Superfund Site
Pedricktown, New Jersey

		Concentration (mg/kg)[a]					
		Exchangeable	Carbonate	Fe-Mn oxides	Organic	Residual	Total
Analyte	Sample	Extraction by $MgCl_2$ solution, pH=7; analysis by EPA Method 200.8	Extraction by Na-acetate solution, pH=5.0; analysis by EPA Method 200.8	Extraction by NH_2OH-HCl in acetic acid, pH=2; analysis by EPA Method 200.8	Extraction by HNO_3, H_2O_2, & NH_4-acetate, pH=2; analysis by EPA Method 200.8	Extraction by HNO_3, HF, $HClO_4$, HCl, pH<1; analysis by EPA Method 200.8	Extraction by concentrated HNO_3 and HCl (EPA Method 3010A); pH<1; analysis by EPA Method 6020
Lead	SV2910-12071598	<0.1	<0.1	0.36	<0.1	2.2	2.8
	SV2812-16071698	<0.1	0.17	<0.1	<0.1	0.96	1.9
	SV071698-Dup	<0.1	0.14	<0.1	<0.1	0.87	2.3
	SV26072098	<0.1	<0.1	0.14	<0.1	1.6	4.1
Cadmium	SV2910-12071598	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	SV2812-16071698	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	SV071698-Dup	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	SV26072098	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

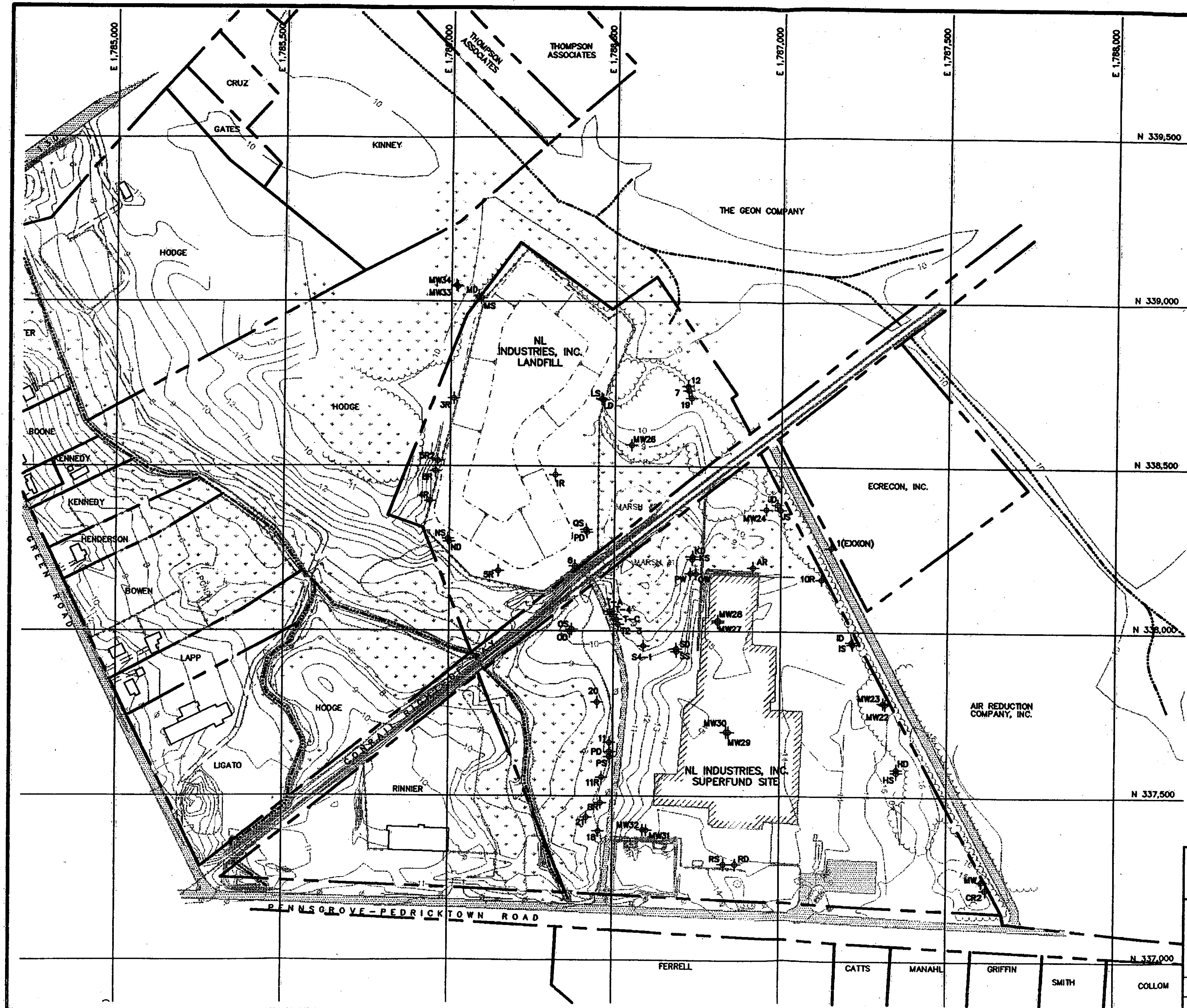
a. Lead and cadmium concentrations associated with each of the identified soil phases are listed below along with summaries of the laboratory extraction and analysis methods. Extraction methods for lead and cadmium associated with the exchangeable, carbonate, Fe-Mn oxide, organic, and residual soil phases are as described in Harrison, R. M., Laxen, D.P., and Wilson, S.J., 1981, "Chemical Associations of Lead, Cadmium, Copper, and Zinc in Street Dusts and Roadside Soils", Environmental Science & Technology, V.15, No. 11, pp. 1378-1383, November. This methodology is further described in Tessler, A., Campbell, P.G.C., and Bisson, M., 1979, "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals," Analytical Chemistry, V.51, No.7, June.

TABLE 11-3

SUMMARY OF SELECTED SOIL PROPERTIES

Phase II Groundwater Evaluation
NL Industries Superfund Site
Pedricktown, New Jersey

Sample	pH	CEC (meq/100g dw)
SV2910-12071598	7.3	3.57/1.70
SV2812-16071698	6.6	1.13/0.89
SV071698-Dup	6.0	0.91/0.91
SV26072098	6.2	2.72/1.83



NORTH

LEGEND

- PROPERTY BOUNDARY
- CONTOUR OF EXISTING GROUND ELEVATION (FT, MSL)
- EXISTING FENCE
- EXISTING RAILROAD LINE
- EXISTING TREELINE
- EXISTING STREAM
- EXISTING ROAD
- APPROXIMATE LIMITS OF EXPOSED CONCRETE FOUNDATION
- EXISTING BUILDING
- MW27 GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.

300 150 0 300

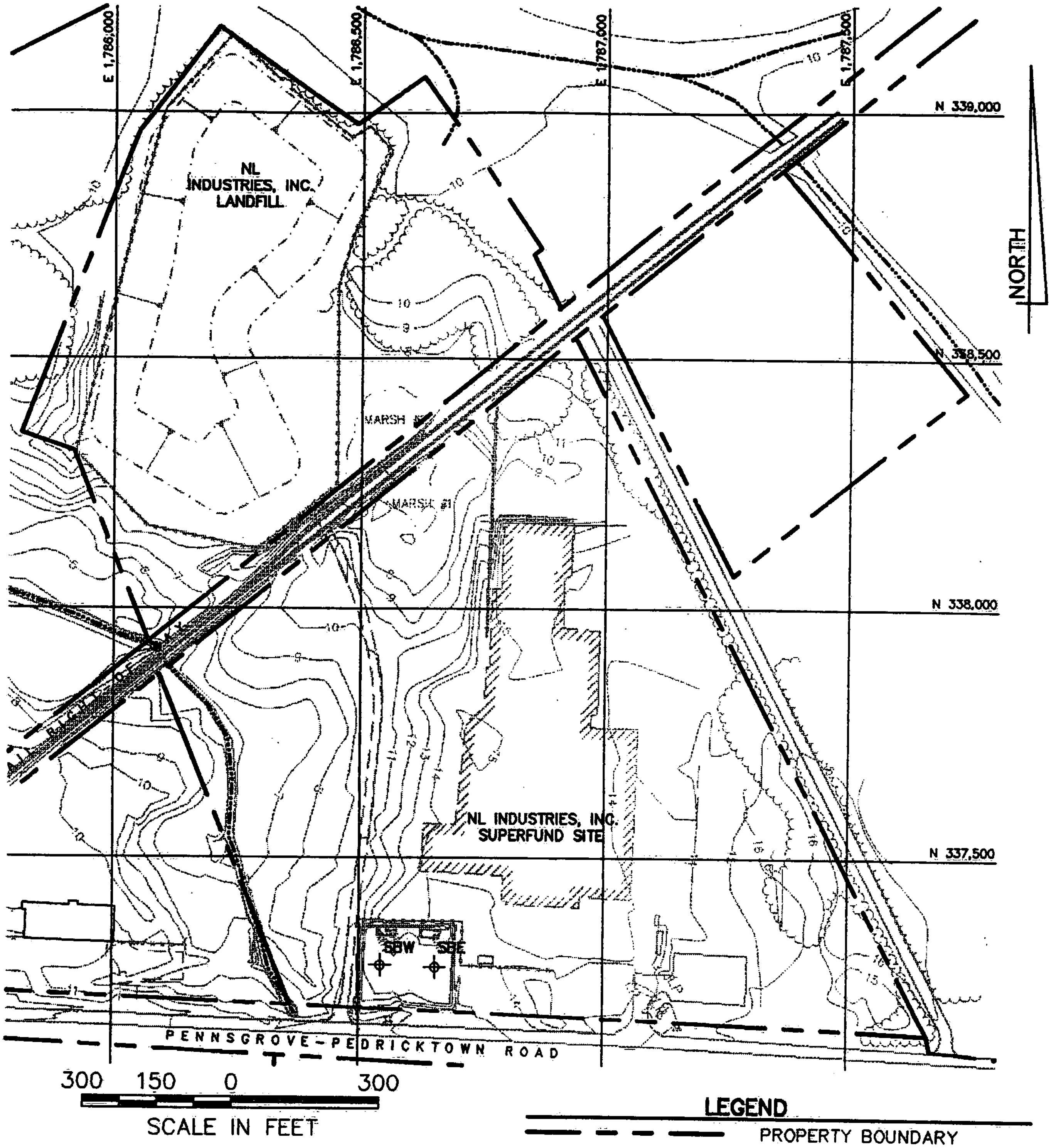
SCALE IN FEET

SITE PLAN

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND

PROJECT NO.	MR0015-15	FIGURE NO.	2-1
DOCUMENT NO.	–	FILE NO.	0015F110



LEGEND

PROPERTY BOUNDARY

CONTOUR OF EXISTING GEOUND ELEVATION (FT, MSL)

EXISTING STREAM

SBW APPROXIMATE LOCATION OF SEPTIC BED BORINGS

NOTES:

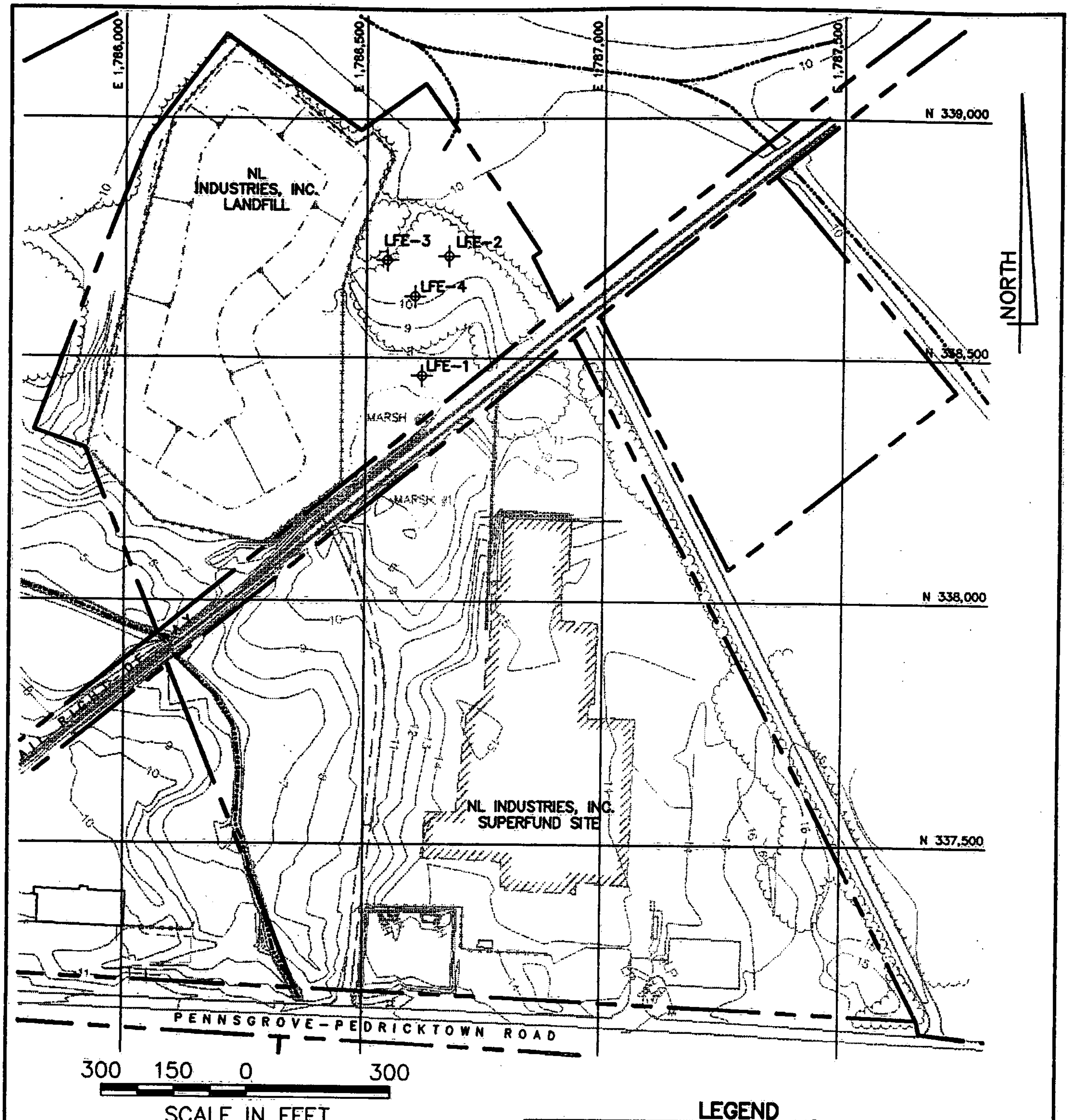
1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND

SEPTIC BED BORING LOCATION PLAN

FIGURE NO.	3–1
PROJECT NO.	MR0015–15
DOCUMENT NO.	–
FILE NO.	0015F116



LEGEND

PROPERTY BOUNDARY

CONTOUR OF EXISTING GEOUND ELEVATION (FT, MSL)

EXISTING STREAM

LFE-1 LANDFILL EVALUATION BORING LOCATION AND DESIGNATION

NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.
4. LOCATIONS OF LANDFILL EVALUATION BORINGS ARE APPROXIMATE.

GEOSYNTEC CONSULTANTS

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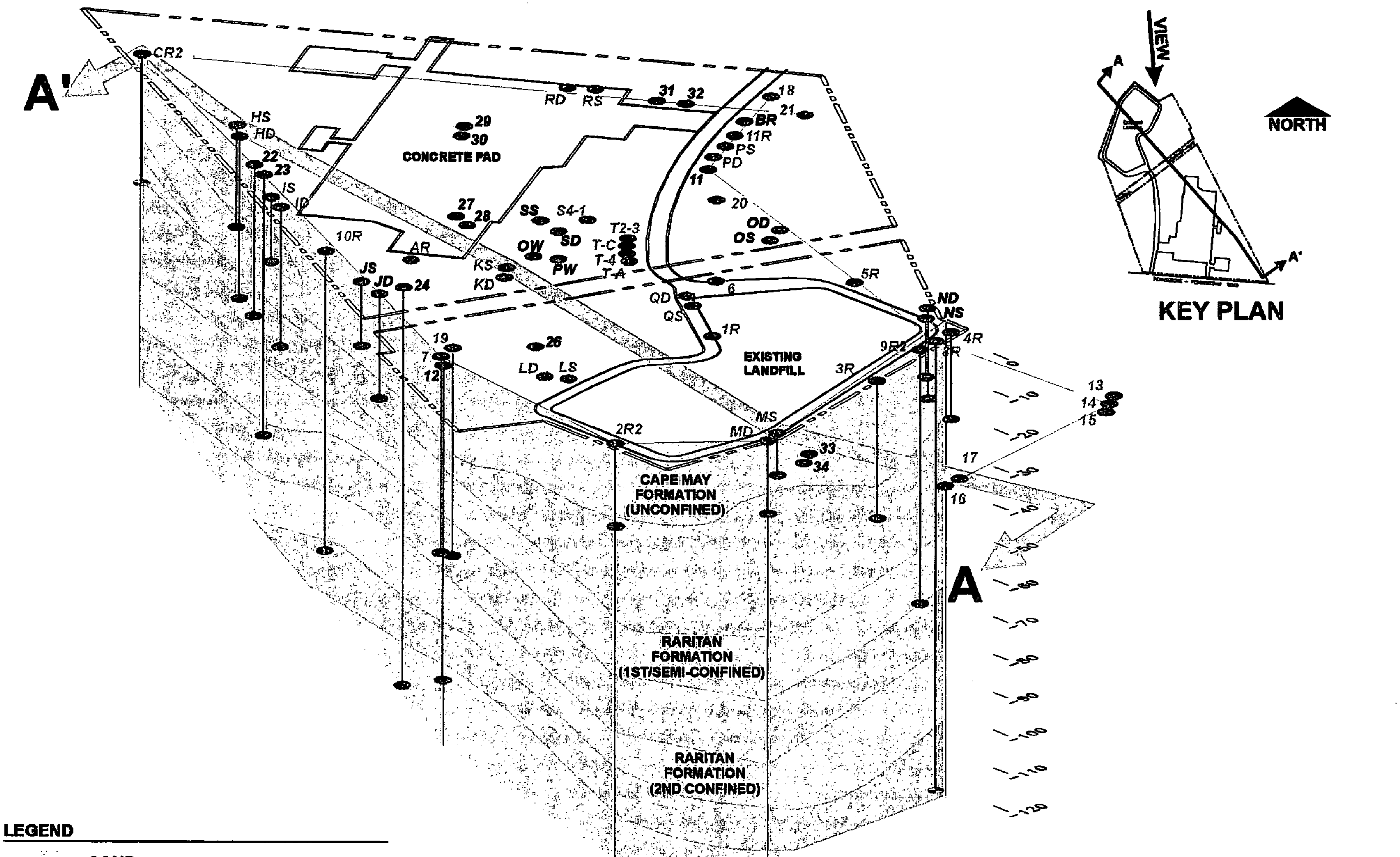
LANDFILL SITING EVALUATION SAMPLING PLAN

FIGURE NO.	4–1
PROJECT NO.	MR0015–15
DOCUMENT NO.	–
FILE NO.	0015F114



LEGEND

SAND

CLAY

33 GROUNDWATER MONITORING WELL AND DESIGNATION *(SHADED LABEL INDICATES WELL NOT SAMPLED)*

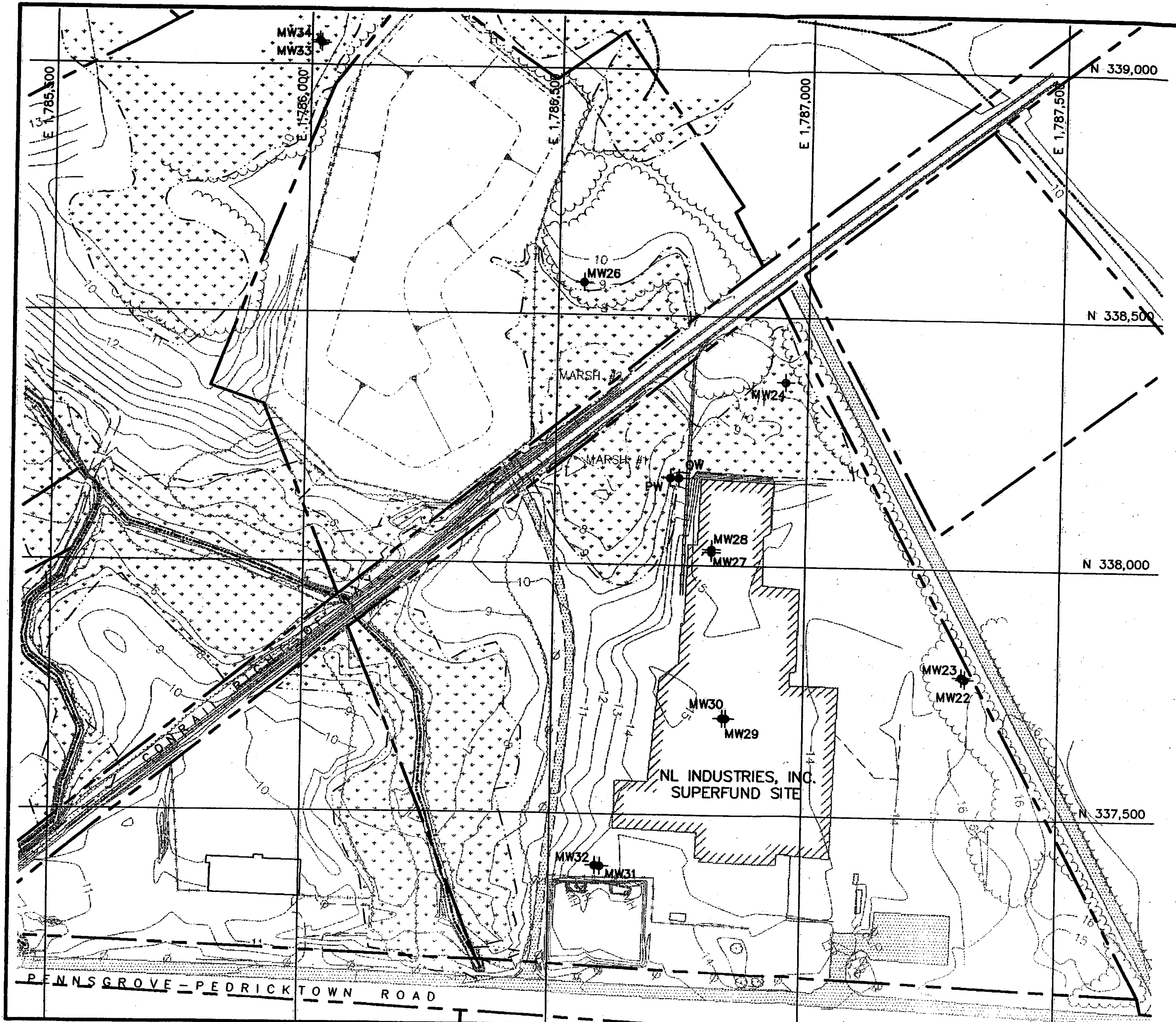
NOTE: NOT TO SCALE, VERTICAL EXAGGERATION = 20

SITE SUBSURFACE MODEL - VIEW FROM NORTH AND EAST

NL INDUSTRIES SUPERFUND SITE, PEDRICKTOWN, NEW JERSEY

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	4-2
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-xNE.cdr



LEGEND

- PROPERTY BOUNDARY
- CONTOUR OF EXISTING GROUND SURFACE (FT, MSL)
- EXISTING FENCE
- EXISTING RAILROAD LINE
- EXISTING TREELINE
- EXISTING STREAM
- EXISTING ROAD
- EXISTING WETLANDS
- APPROXIMATE LIMITS OF EXPOSED CONCRETE FOUNDATION
- EXISTING BUILDING
- 28 NEW MONITORING WELLS INSTALLED AND SAMPLED DURING PHASE II EVALUATION

NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.

200 100 0 200
SCALE IN FEET

MONITORING WELL INSTALLATION PLAN
PHASE II GROUNDWATER EVALUATION

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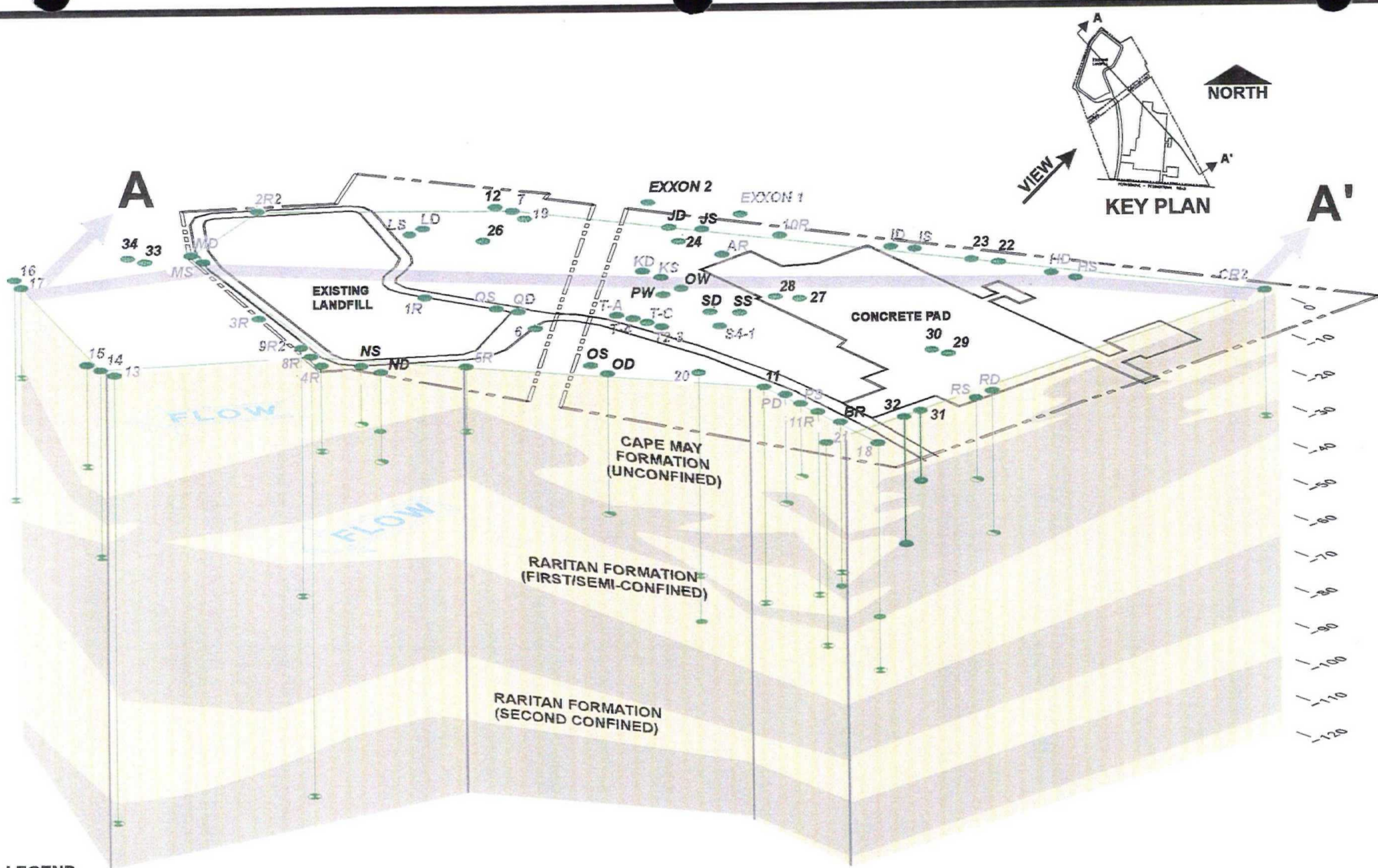
COLUMBIA, MARYLAND

PROJECT NO.	MR0015-15	FIGURE NO.	5-1
DOCUMENT NO.	–	FILE NO.	0015F115



LEGEND

SAND

CLAY

GROUNDWATER MONITORING WELL AND DESIGNATION *(SHADED LABEL INDICATES WELL NOT SAMPLED)*

4" WELL

2" WELL

NOTE: NOT TO SCALE, VERTICAL EXAGGERATION = 20

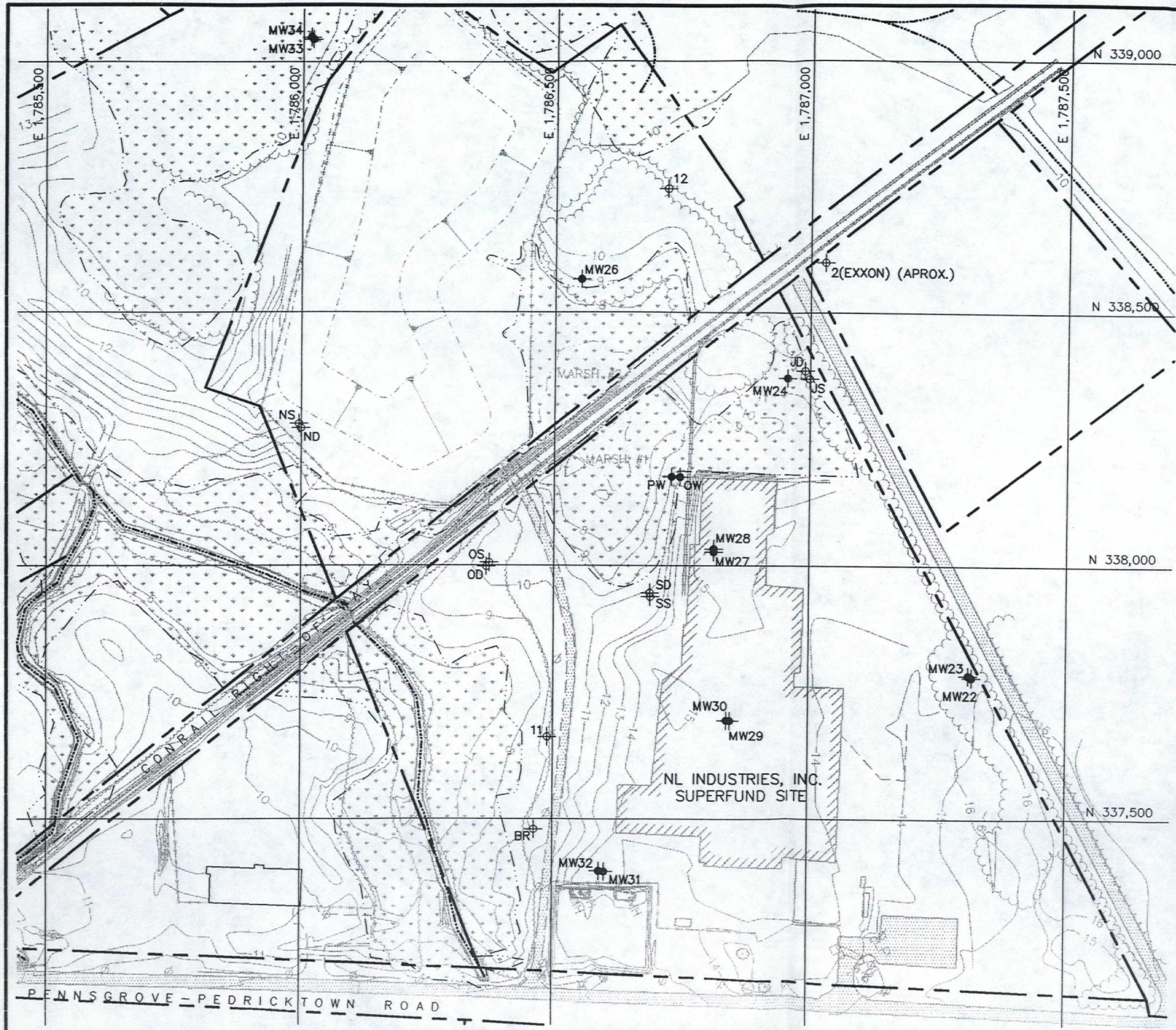
SITE SUBSURFACE MODEL - VIEW FROM SOUTH AND WEST

NL INDUSTRIES SUPERFUND SITE, PEDRICKTOWN, NEW JERSEY

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND

FIGURE NO.	5-2
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-xSW.cdr



LEGEND

- PROPERTY BOUNDARY
- CONTOUR OF EXISTING GROUND SURFACE (FT, MSL)
- EXISTING FENCE
- EXISTING RAILROAD LINE
- EXISTING TREELINE
- EXISTING STREAM
- EXISTING ROAD
- EXISTING WETLANDS
- APPROXIMATE LIMITS OF EXPOSED CONCRETE FOUNDATION
- EXISTING BUILDING
- JS — EXISTING MONITORING WELLS SAMPLED DURING PHASE II INVESTIGATION
- 28 — NEW MONITORING WELLS INSTALLED AND SAMPLED DURING PHASE II INVESTIGATION

NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.

200 100 0 200

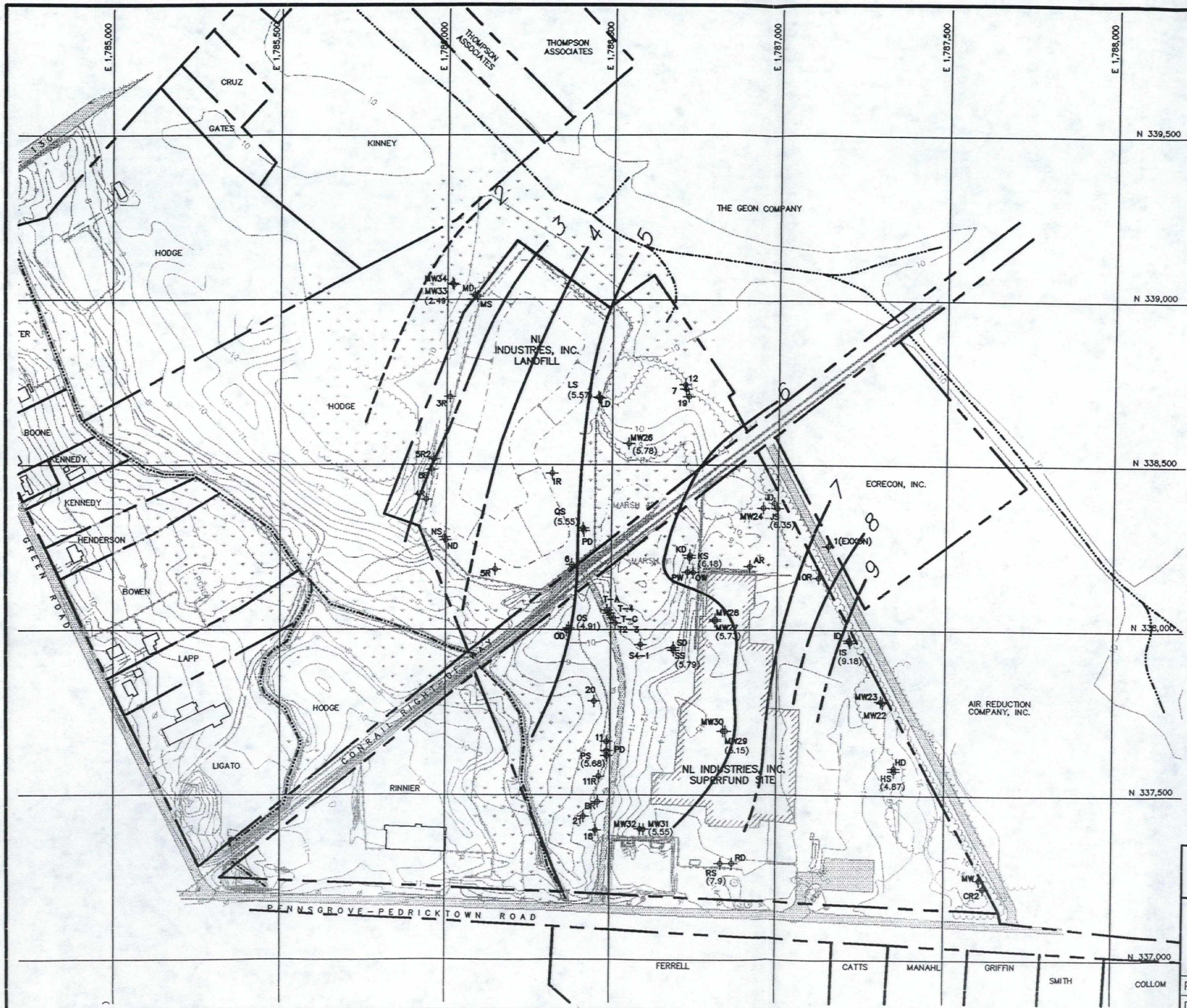
SCALE IN FEET

PHASE II MONITORING WELL SAMPLING PLAN

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND

PROJECT NO.	MR0015-15	FIGURE NO.	7-1
DOCUMENT NO.	–	FILE NO.	0015F109



LEGEND

- SITE BOUNDARY
- CONTOUR OF EXISTING GROUND SURFACE (FT, MSL)
- EXISTING FENCE
- EXISTING RAILROAD LINE
- EXISTING TREELINE
- EXISTING STREAM
- EXISTING ROAD
- APPROXIMATE LIMITS OF EXPOSED CONCRETE FOUNDATION
- EXISTING BUILDING
- MW27 GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- 9 POTENTIOMETRIC SURFACE ELEVATION (FT, MSL)

NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.

300 150 0 300

SCALE IN FEET

POTENTIOMETRIC SURFACE MAP
16 DECEMBER 1999

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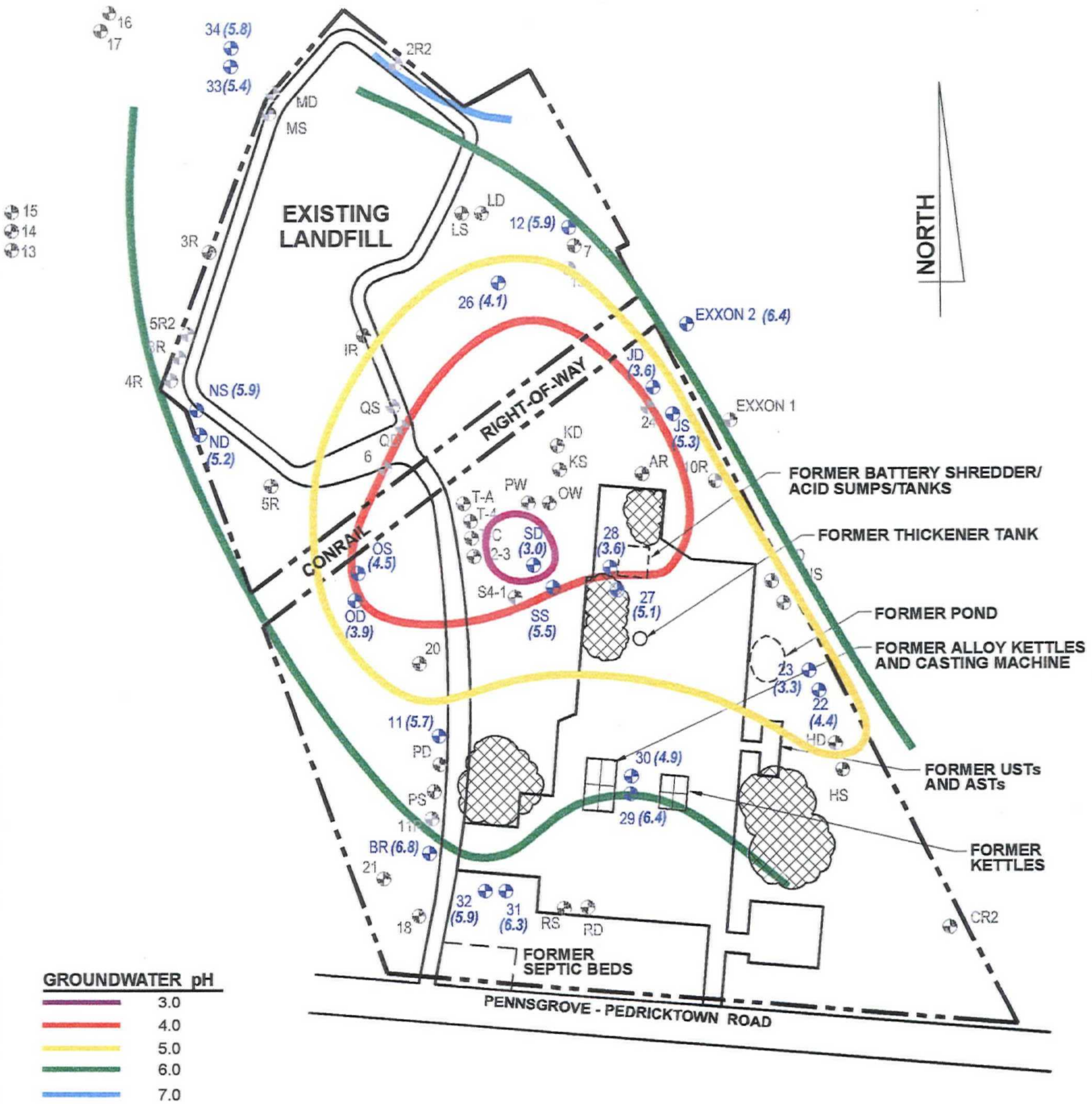
COLUMBIA, MARYLAND

PROJECT NO.	MR0015-15	FIGURE NO.	7-2
DOCUMENT NO.	–	FILE NO.	0015F117



GROUNDWATER pH

(purple)	3.0
(red)	4.0
(yellow)	5.0
(green)	6.0
(blue)	7.0

300 150 0 300

APPROXIMATE SCALE IN FEET

LEGEND

13	WELL & DESIGNATION (NOT SAMPLED)
BR	WELL & DESIGNATION (SAMPLED)
(18)	LEAD CONCENTRATION (PPB)
	FORMER SLAG PILE LOCATION

NOTE: GROUNDWATER pH CONTOURS SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

pH of Groundwater - 1998

NL Industries Site
Pedricktown, New Jersey

FIGURE NO.	7-3
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-pH98

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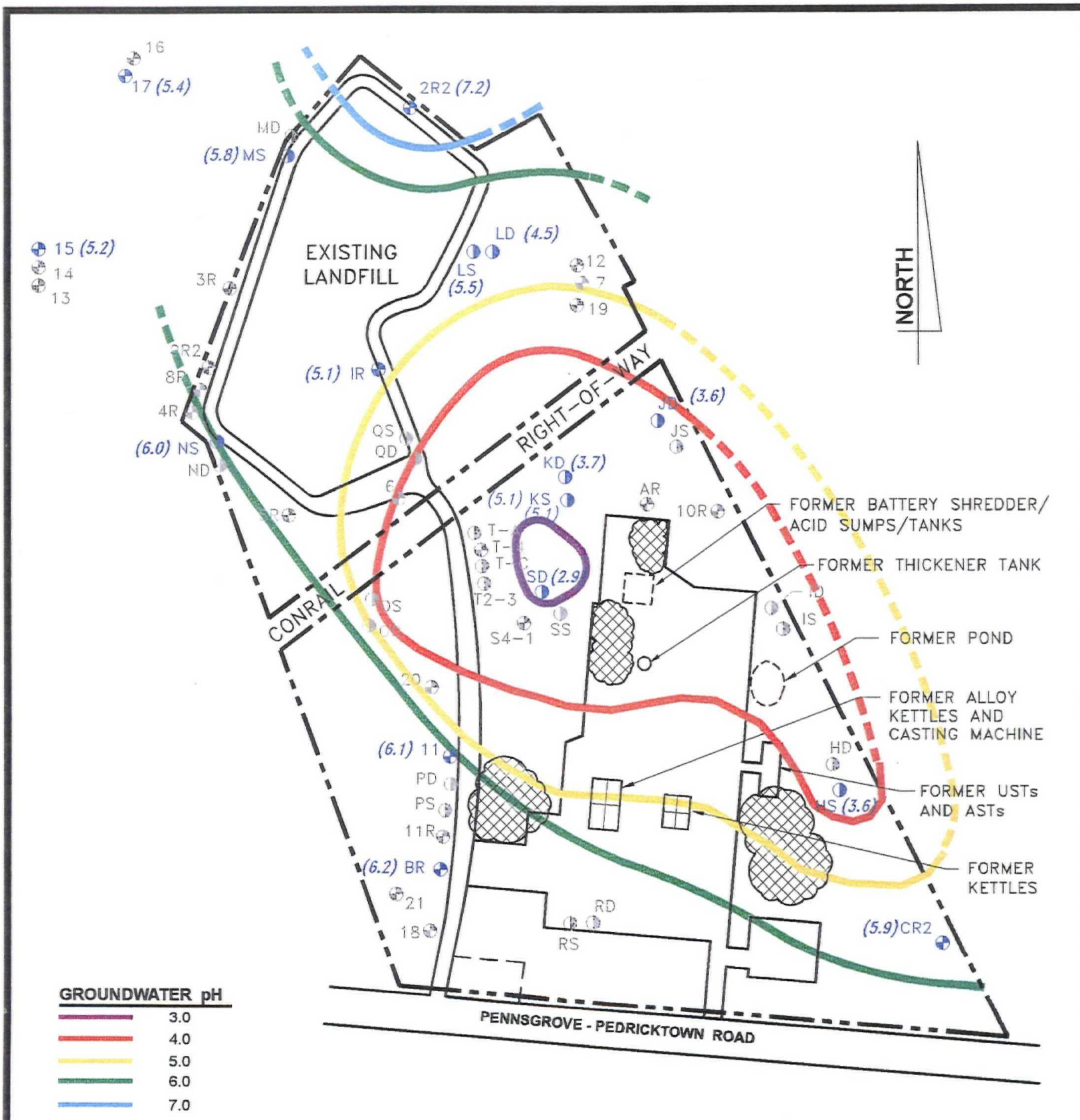

LEGEND

RD	2" WELL (NESTED PAIR) & DESIGNATION
CR2	4" WELL & DESIGNATION
(4.5)	GROUNDWATER pH
	FORMER SLAG PILE LOCATION

NOTE: GROUNDWATER pH CONTOURS SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

pH of Groundwater - 1997

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
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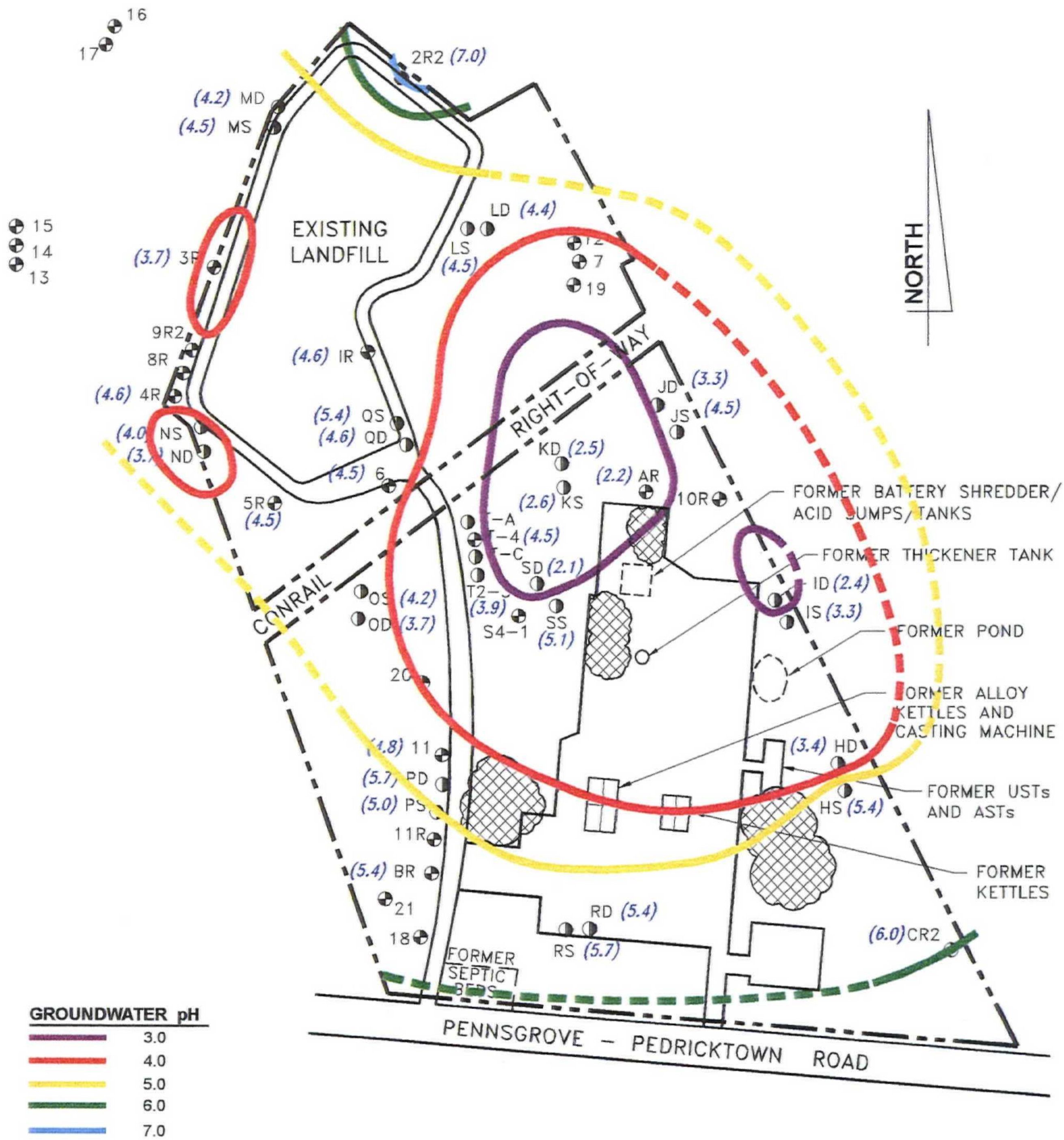
FIGURE NO.	7-4
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-pH97



LEGEND

◑	RD	2" WELL (NESTED PAIR) & DESIGNATION
⊕	CR2	4" WELL & DESIGNATION
(4.5)		GROUNDWATER pH
		FORMER SLAG PILE LOCATION

NOTE: GROUNDWATER pH CONTOURS SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

300 150 0 300

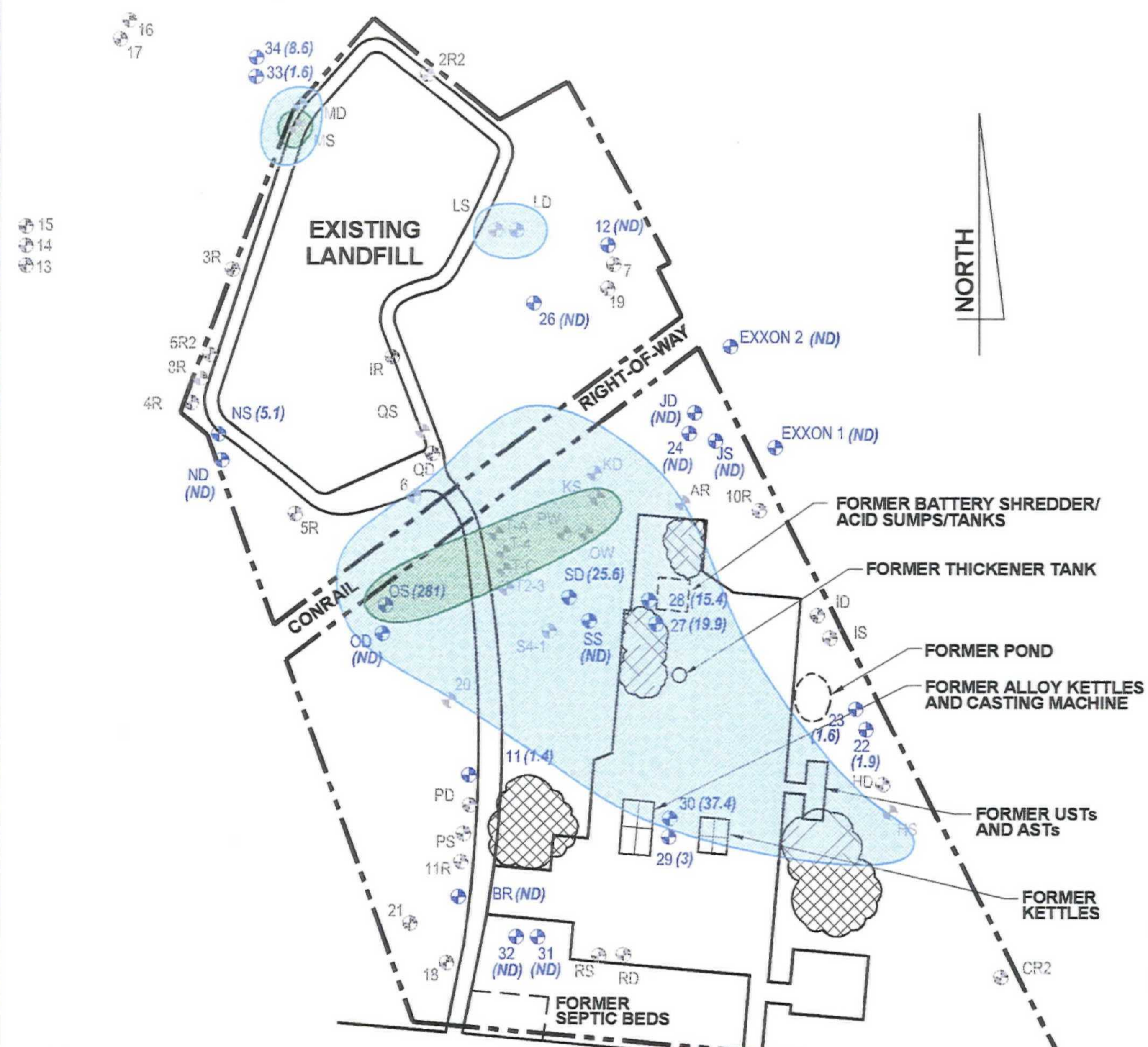
APPROXIMATE SCALE IN FEET

pH of Groundwater - 1983

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-5
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-pH83



LEAD CONCENTRATION

100 ppb ≤ [green] ∠ 500 ppb

10 ppb ≤ [blue] ∠ 100 ppb

LEGEND

18	WELL & DESIGNATION (NOT SAMPLED)
CR2	WELL & DESIGNATION (SAMPLED)
(18)	LEAD CONCENTRATION (PPB)
(ND)	NOT DETECTED
	FORMER SLAG PILELOCATION

300 150 0 300

APPROXIMATE SCALE IN FEET

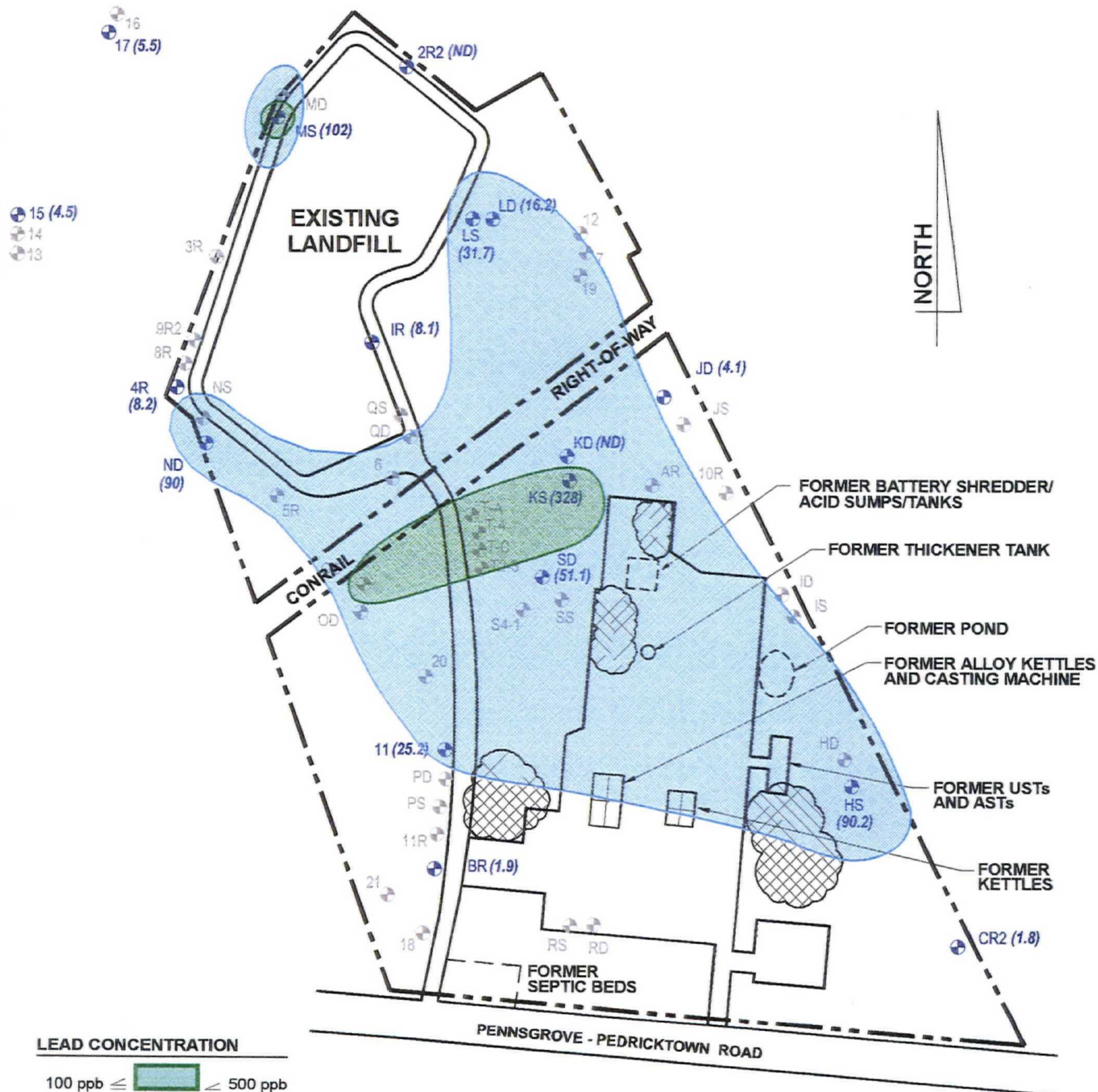
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Total Lead Concentrations in the Unconfined Aquifer - 1998

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-6
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-L98



LEAD CONCENTRATION

100 ppb ≤ [green] ≤ 500 ppb

10 ppb ≤ [blue] ≤ 100 ppb

LEGEND

18	WELL & DESIGNATION (NOT SAMPLED)
CR2	WELL & DESIGNATION (SAMPLED)
(18)	LEAD CONCENTRATION (PPB)
(ND)	NOT DETECTED
	FORMER SLAG PILE LOCATION

300 150 0 300

APPROXIMATE SCALE IN FEET

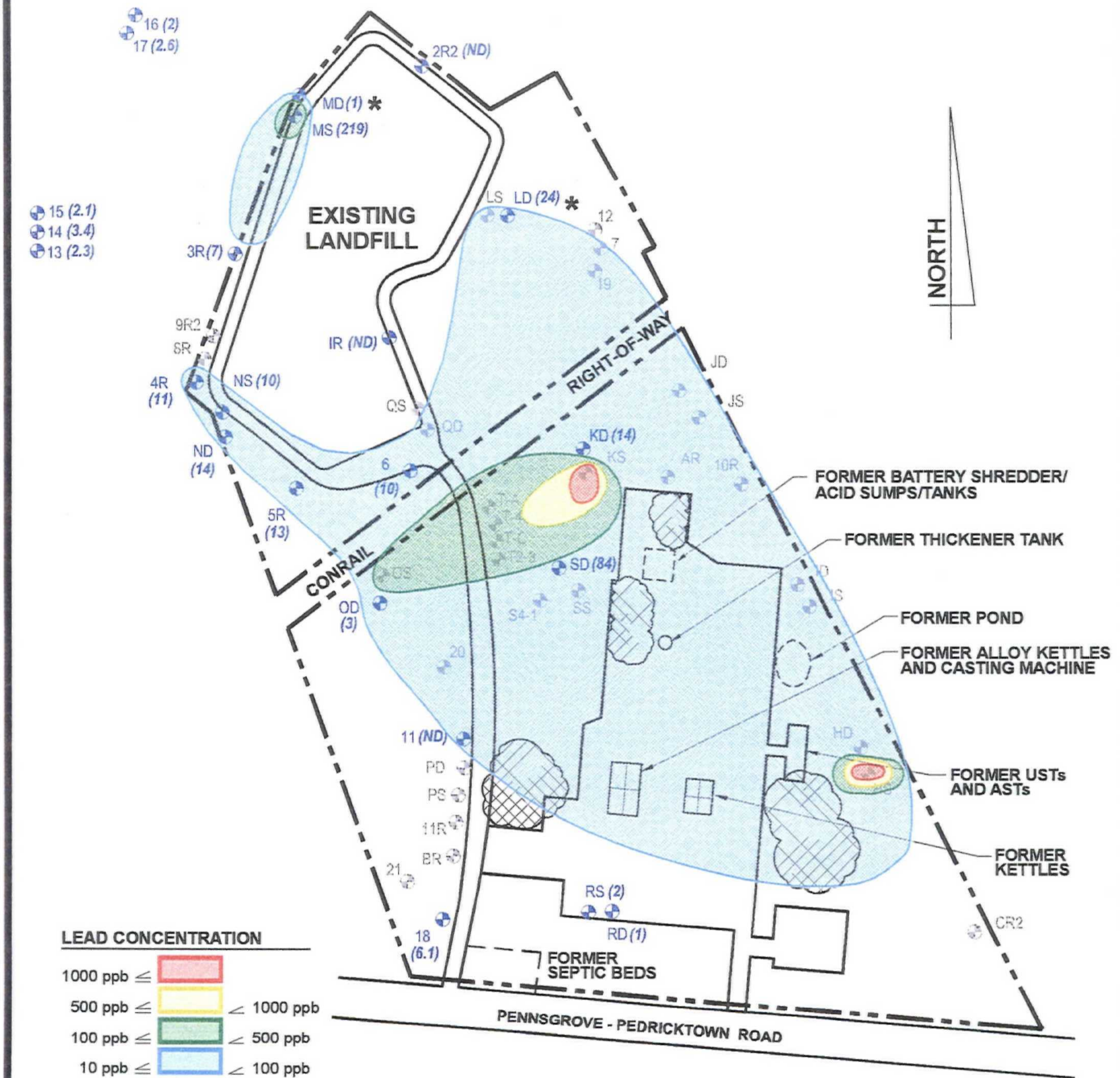
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Total Lead Concentrations in the Unconfined Aquifer - 1997

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-7
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-L97



LEAD CONCENTRATION

1000 ppb ≤
500 ppb ≤ ... < 1000 ppb
100 ppb ≤ ... < 500 ppb
10 ppb ≤ ... < 100 ppb

LEGEND

- WELL & DESIGNATION (NOT SAMPLED)
- CR2 — WELL & DESIGNATION (SAMPLED)
- (18) — LEAD CONCENTRATION (PPB)
- (ND) — NOT DETECTED
- * — TOTAL LEAD CONCENTRATION; SAMPLE WAS NOT FILTERED DUE TO LOW TURBIDITY (< 5 NTUs)
- FORMER SLAG PILE LOCATION

NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Dissolved Lead Concentrations in the Unconfined Aquifer - 1989/1990

NL Industries Site
Pedricktown, New Jersey

FIGURE NO.	7-8
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-L89

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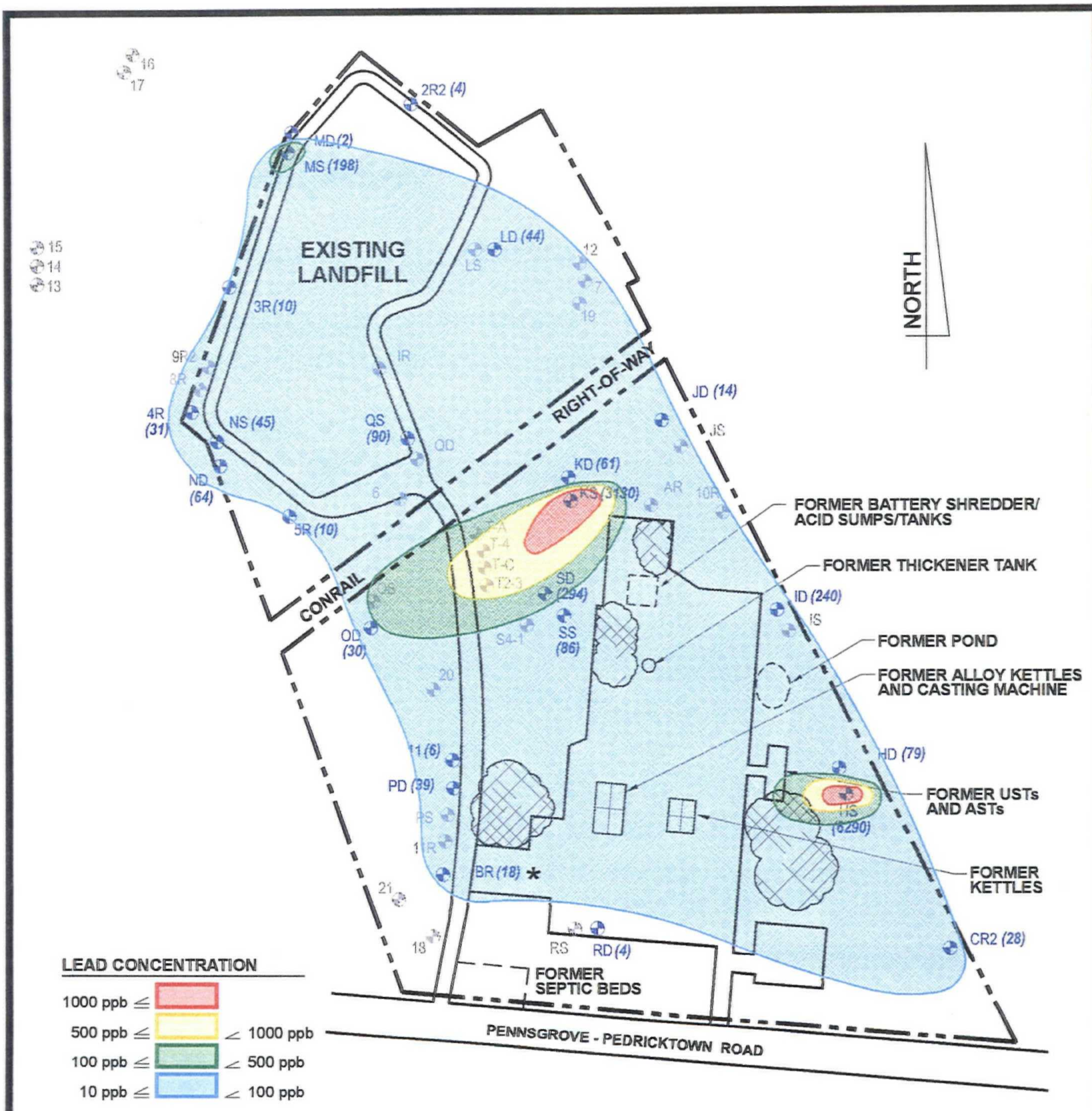


LEGEND

- WELL & DESIGNATION (NOT SAMPLED)
- CR2 WELL & DESIGNATION (SAMPLED)
- (18) LEAD CONCENTRATION (PPB)
- (ND) NOT DETECTED
- * TOTAL LEAD CONCENTRATION; SAMPLE WAS NOT FILTERED DUE TO LOW TURBIDITY (< 5 NTUs)
- FORMER SLAG PILE LOCATION

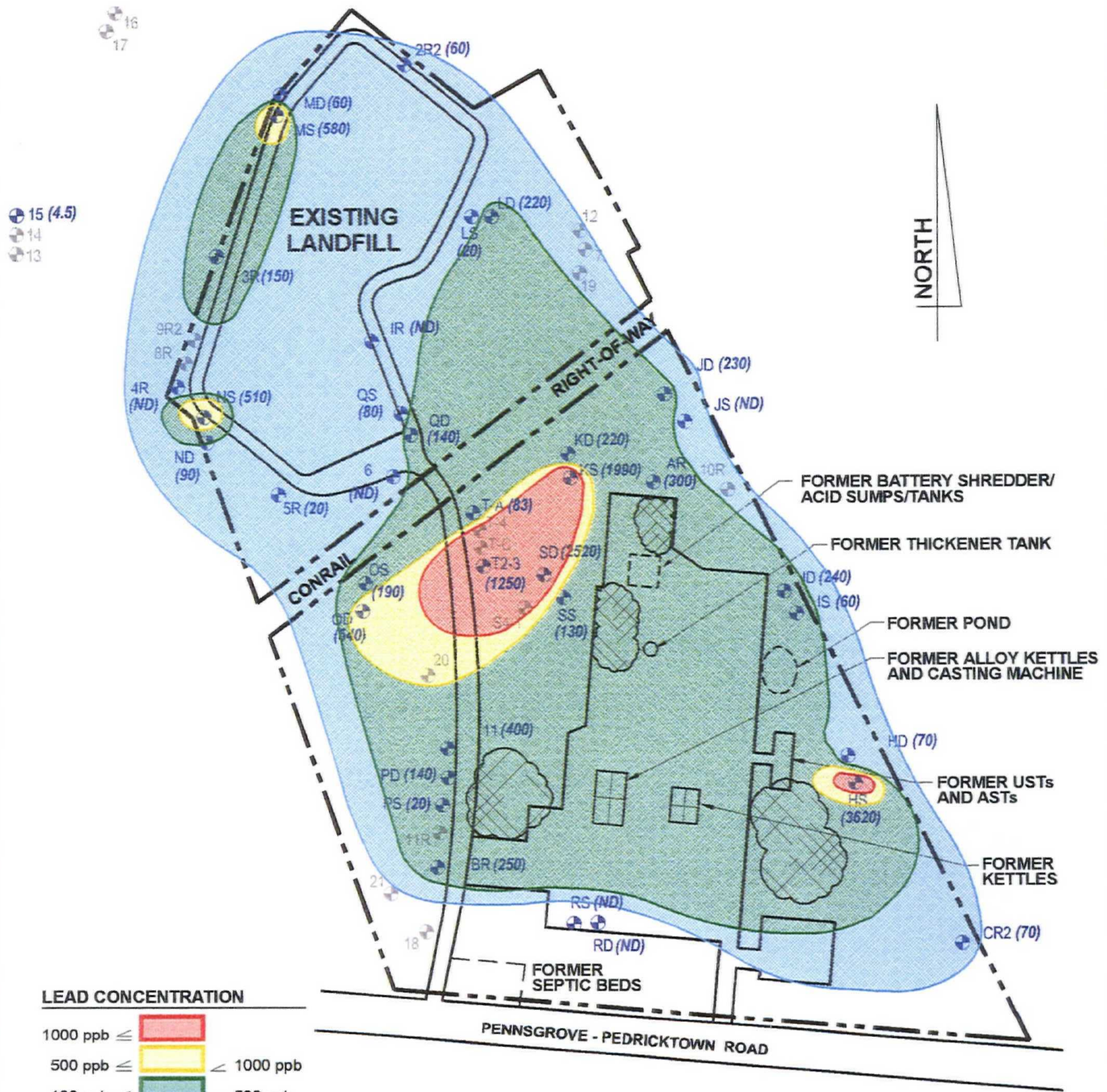
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Dissolved Lead Concentrations in the Unconfined Aquifer - 1988

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-9
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-L88



LEAD CONCENTRATION

1000 ppb ≤

500 ppb ≤ < 1000 ppb

100 ppb ≤ < 500 ppb

10 ppb ≤ < 100 ppb

LEGEND

18	WELL & DESIGNATION (NOT SAMPLED)
CR2	WELL & DESIGNATION (SAMPLED)
(18)	LEAD CONCENTRATION (PPB)
(ND)	NOT DETECTED
	FORMER SLAG PILE LOCATION

300 150 0 300

APPROXIMATE SCALE IN FEET

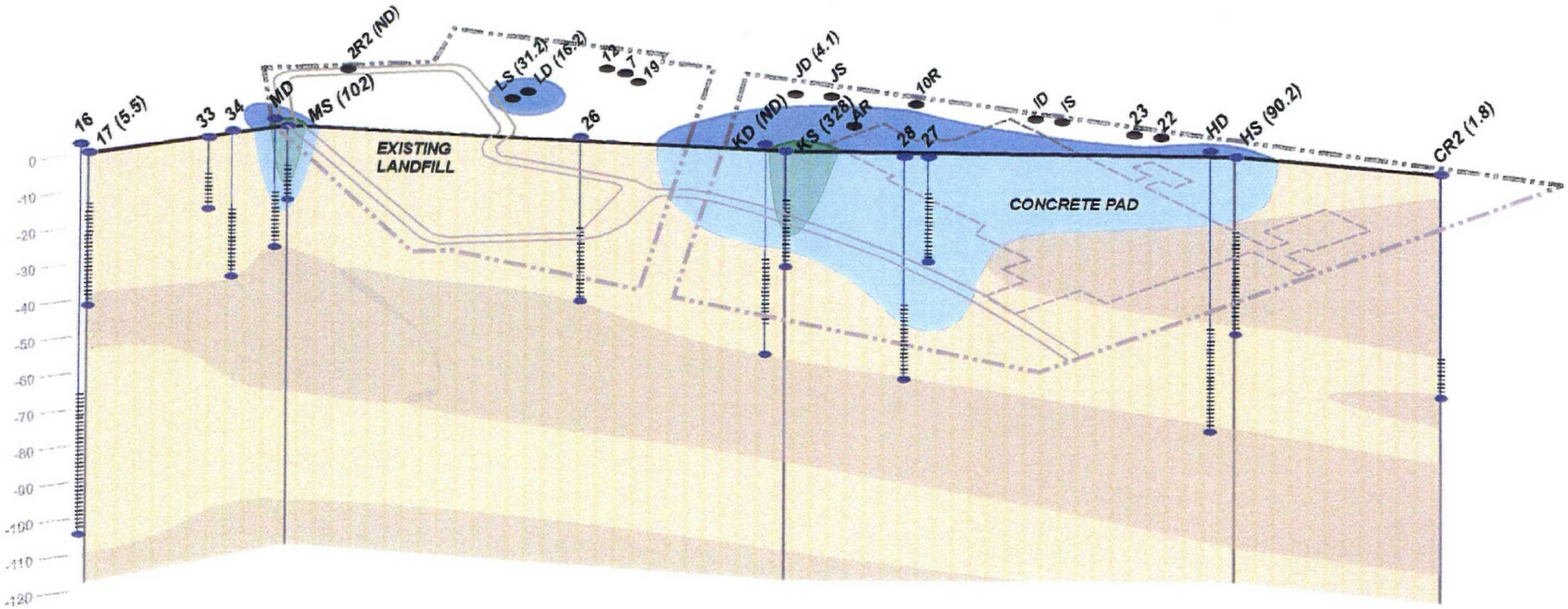
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Dissolved Lead Concentrations in the Unconfined Aquifer - 1983

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-10
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-L83



LEAD CONCENTRATION

100 ppb ≤ [green] < 500 ppb

10 ppb ≤ [blue] < 100 ppb

LEGEND

SAND

CLAY

17 (5.5) WELL DESIGNATION AND (LEAD CONCENTRATION)

GROUNDWATER MONITORING WELL

INDICATES SCREENED PORTION OF PIPE

NOTE: NOT TO SCALE, VERTICAL EXAGGERATION = 20

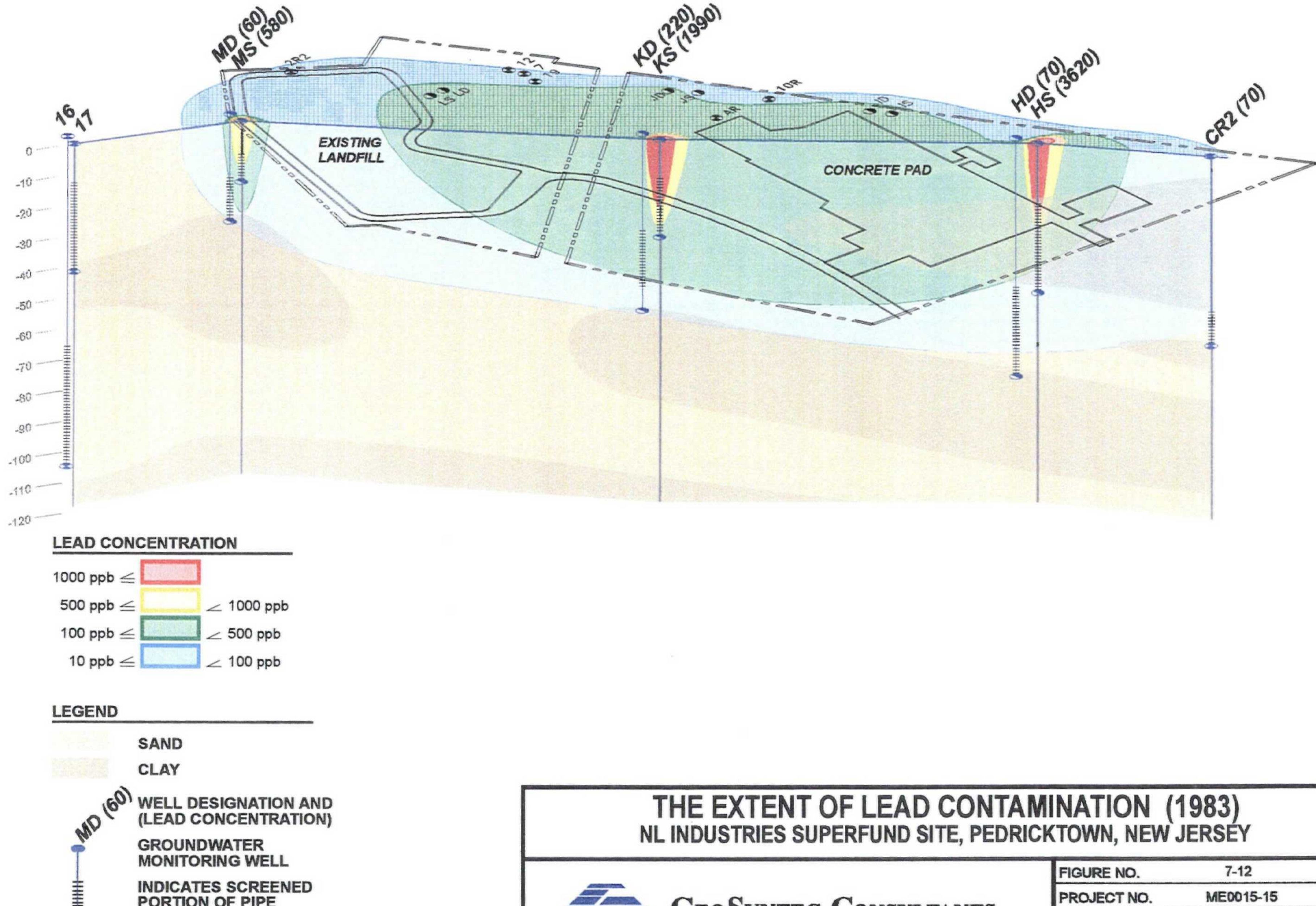
THE EXTENT OF LEAD CONTAMINATION (1998)

NL INDUSTRIES SUPERFUND SITE, PEDRICKTOWN, NEW JERSEY

GeoSyntec Consultants

COLUMBIA, MARYLAND

FIGURE NO.	7-11
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-sec_A2A.cdr



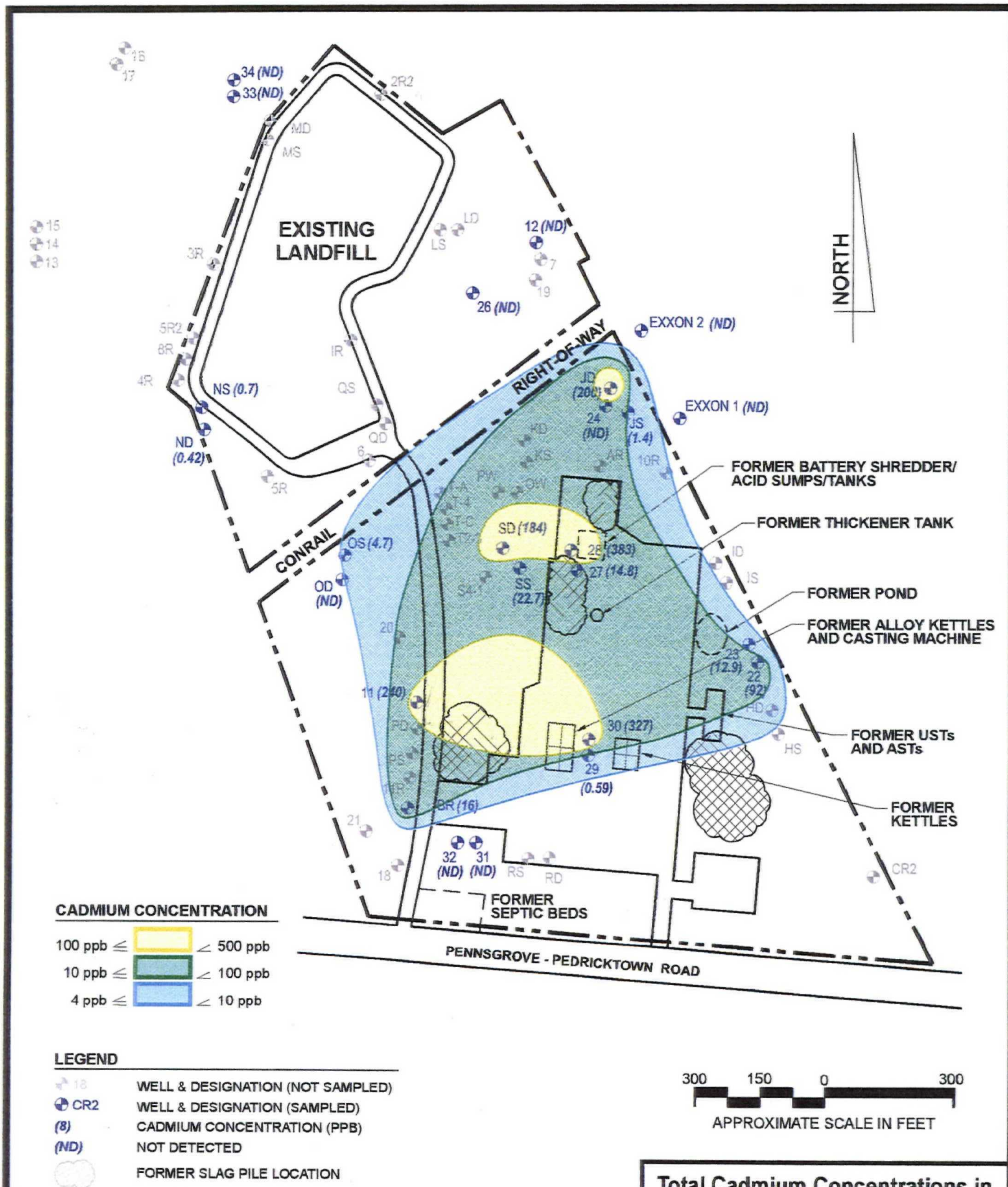
NOTE: NOT TO SCALE, VERTICAL EXAGGERATION = 20

THE EXTENT OF LEAD CONTAMINATION (1983)

NL INDUSTRIES SUPERFUND SITE, PEDRICKTOWN, NEW JERSEY

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-12
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-sec_A1A.cdr



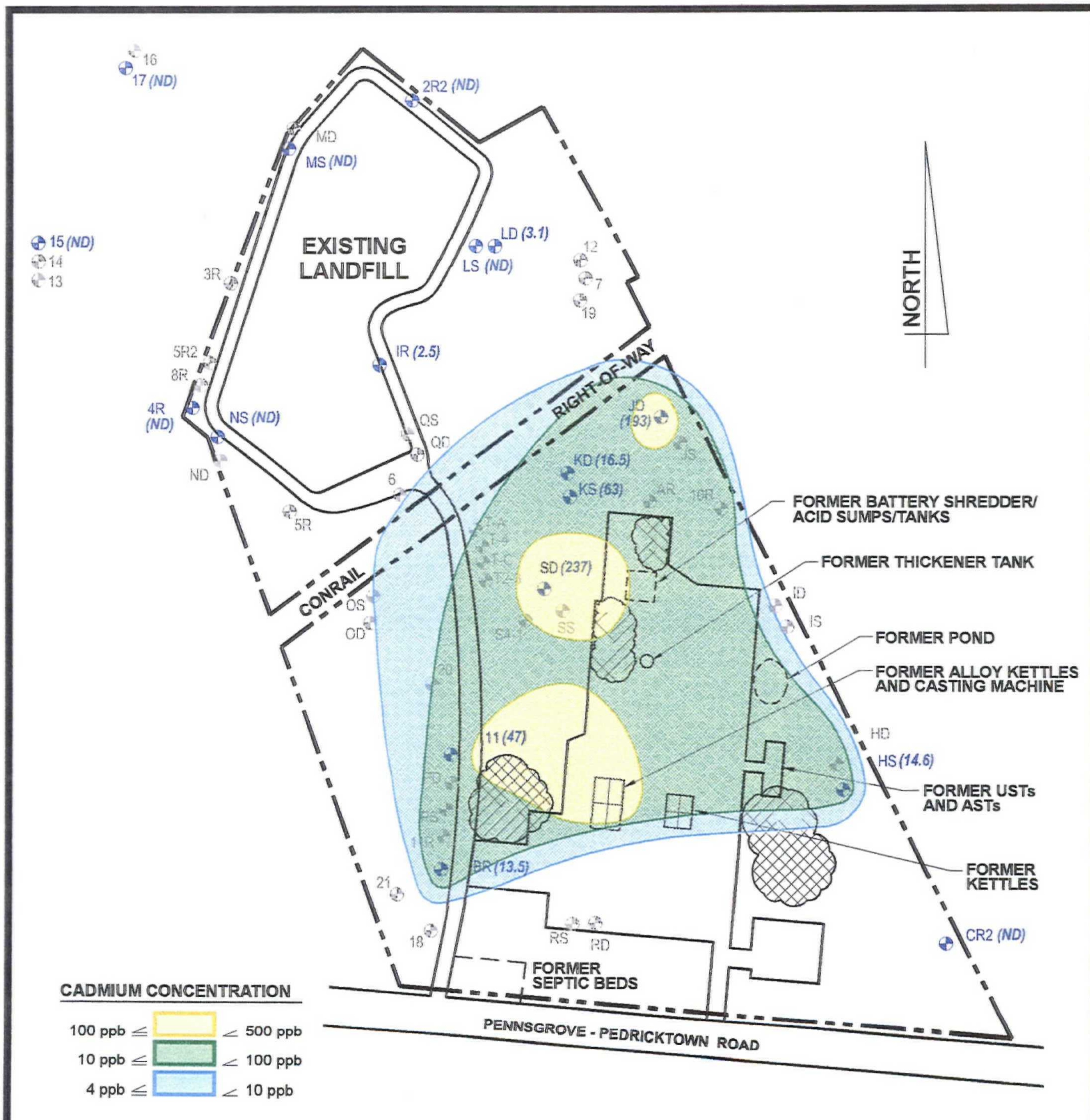
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Total Cadmium Concentrations in the Unconfined Aquifer - 1998

NL Industries Site
Pedricktown, New Jersey

FIGURE NO.	7-13
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-C98

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND



CADMIUM CONCENTRATION

100 ppb ≤ (yellow)	∠ 500 ppb
10 ppb ≤ (green)	∠ 100 ppb
4 ppb ≤ (blue)	∠ 10 ppb

LEGEND

13	WELL & DESIGNATION (NOT SAMPLED)
CR2	WELL & DESIGNATION (SAMPLED)
(8)	CADMIUM CONCENTRATION (PPB)
(ND)	NOT DETECTED
	FORMER SLAG PILE LOCATION

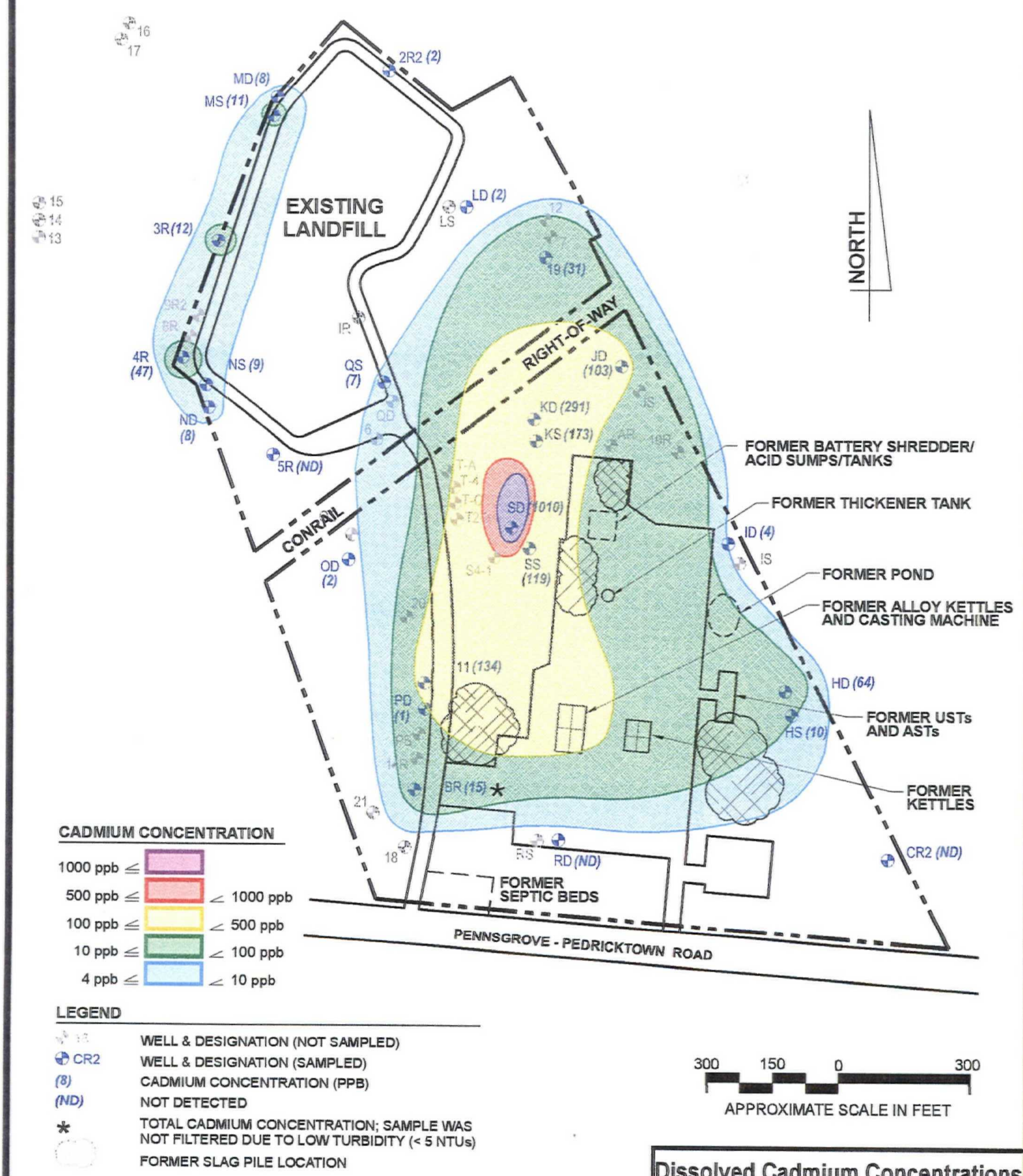
NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Total Cadmium Concentrations in the Unconfined Aquifer - 1997

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-14
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-C97



NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

Dissolved Cadmium Concentrations in the Unconfined Aquifer - 1988

NL Industries Site
Pedricktown, New Jersey

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	7-16
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-C88

CADMIUM CONCENTRATION

500 ppb ≤ (red)
100 ppb ≤ (yellow) < 500 ppb
10 ppb ≤ (green) < 100 ppb
4 ppb ≤ (blue) < 10 ppb

LEGEND

18	WELL & DESIGNATION (NOT SAMPLED)
CR2	WELL & DESIGNATION (SAMPLED)
(8)	CADMIUM CONCENTRATION (PPB)
(ND)	NOT DETECTED
*	TOTAL CADMIUM CONCENTRATION; SAMPLE WAS NOT FILTERED DUE TO LOW TURBIDITY (< 5 NTUs)
	FORMER SLAG PILE LOCATION

NOTE: ISOCONCENTRATION CURVES SHOWN ARE A REPRESENTATIVE COMPOSITE OF DATA FROM SHALLOW AND DEEP WELLS IN THE UNCONFINED AQUIFER.

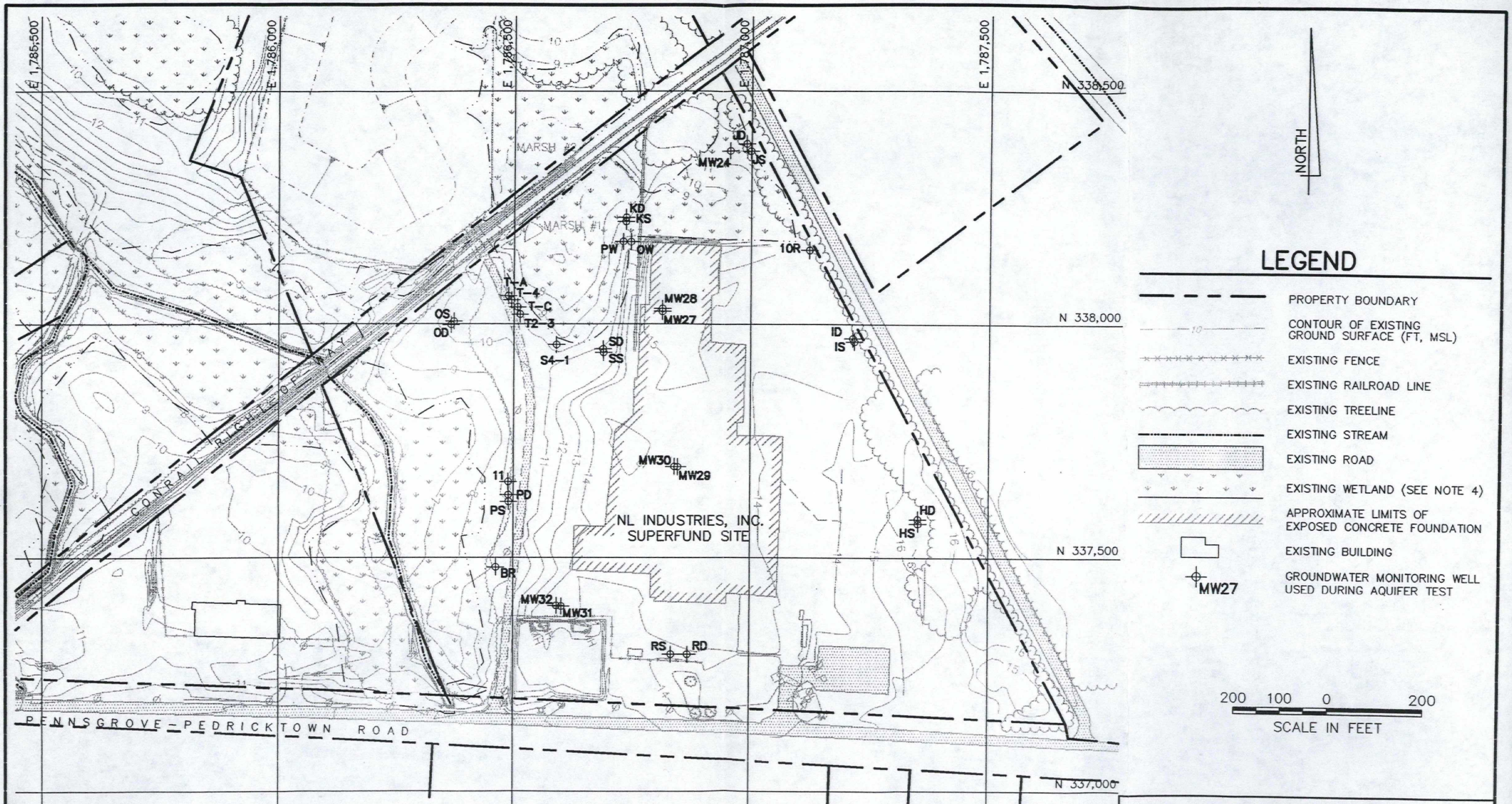
300 150 0 300
APPROXIMATE SCALE IN FEET

Dissolved Cadmium Concentrations in the Unconfined Aquifer - 1989

NL Industries Site
Pedricktown, New Jersey

FIGURE NO.	7-15
PROJECT NO.	ME0015-15
DOCUMENT NO.	-
FILE NO.	phs2-C89

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND



NOTES:

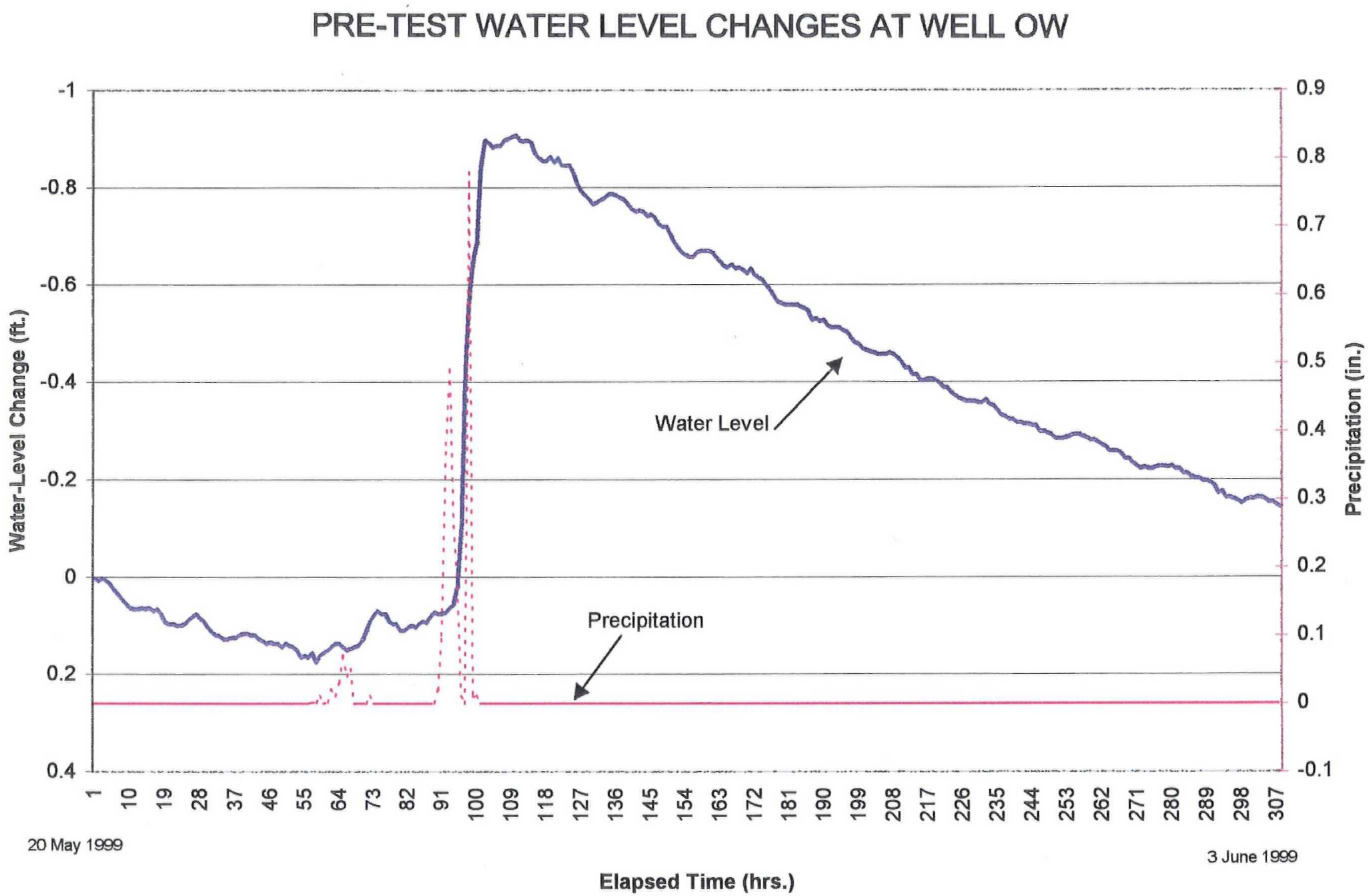
1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.
4. WETLAND AREAS ALONG THE WEST STREAM WERE DELINEATED BY PENNONI ASSOCIATES, INC. FROM FIELD SURVEYS CONDUCTED BETWEEN 5 FEB AND 13 FEB 1999; ALL OTHER WETLANDS ARE BASED ON AREAS DELINEATED BY TALBOT & ASSOCIATES, DECEMBER 1990.

WELL LOCATION PLAN FOR AQUIFER TEST

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND

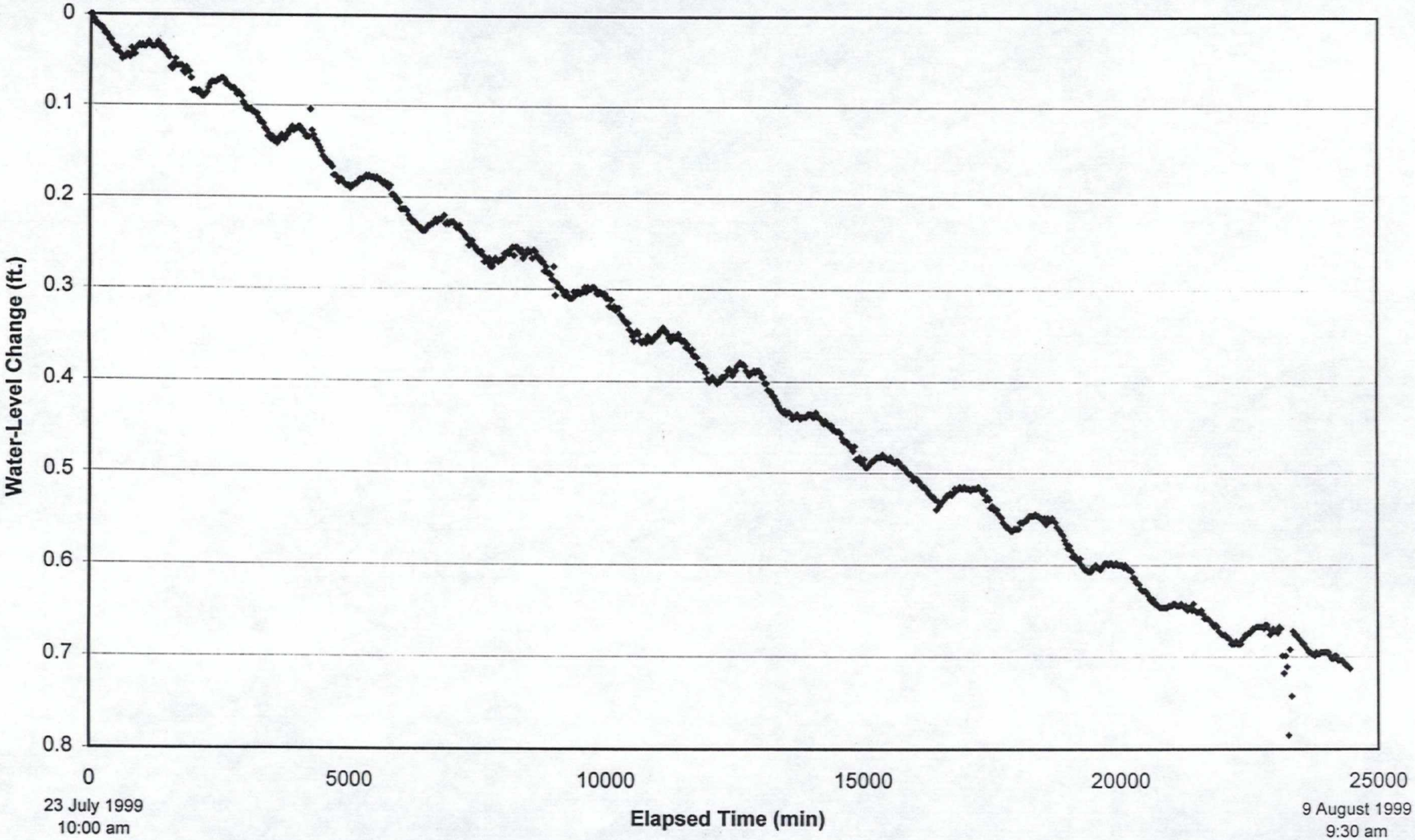
PROJECT NO.	MR0015-15	FIGURE NO.	9-1
DOCUMENT NO.	-	FILE NO.	0015F108



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

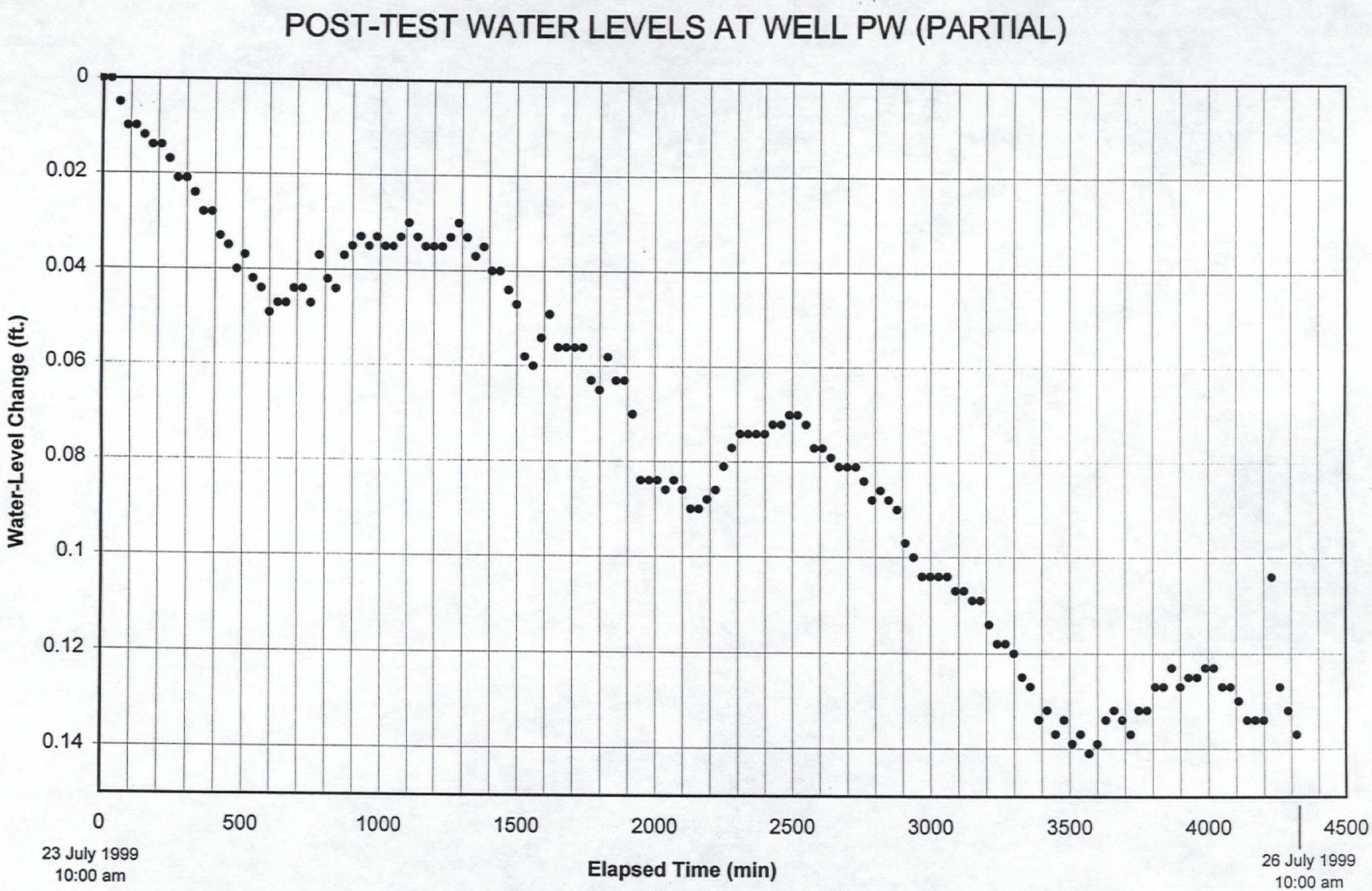
FIGURE NO.	9-2
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

POST-TEST WATER LEVELS AT WELL PW



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9–3
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9-4
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

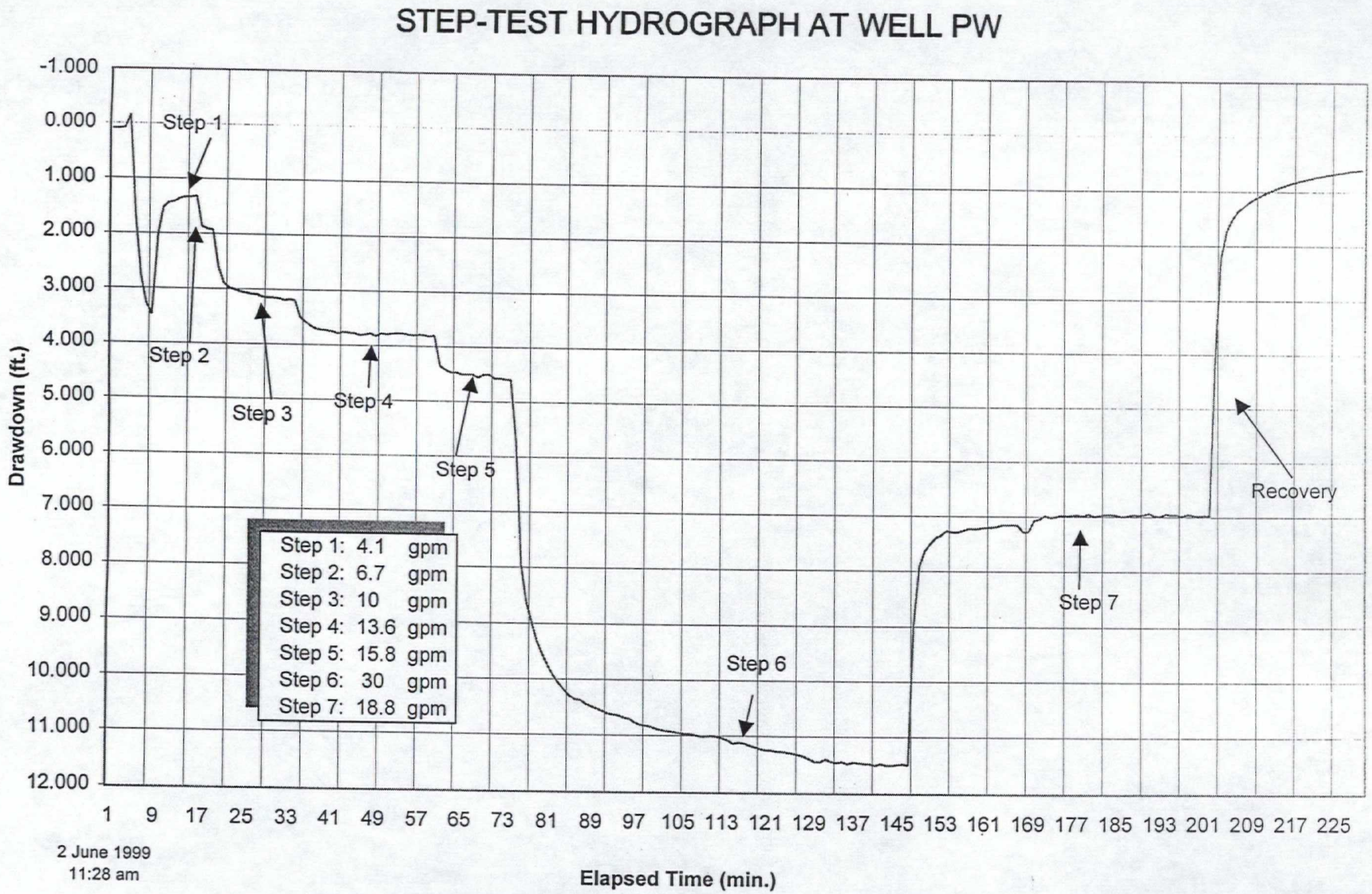
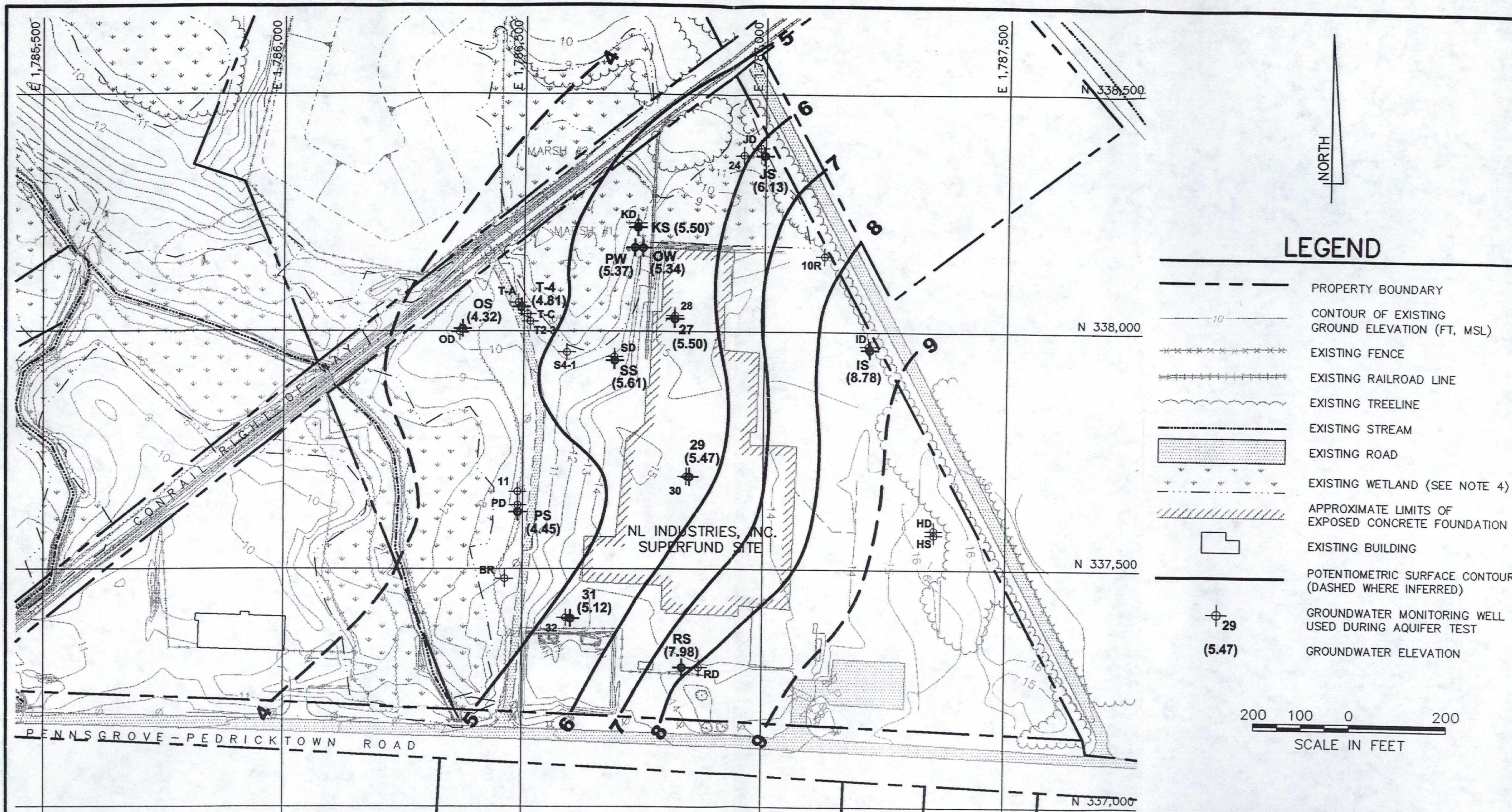


FIGURE NO.	9–5
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

GEOSYNTEC CONSULTANTS

COLUMBIA, MARYLAND



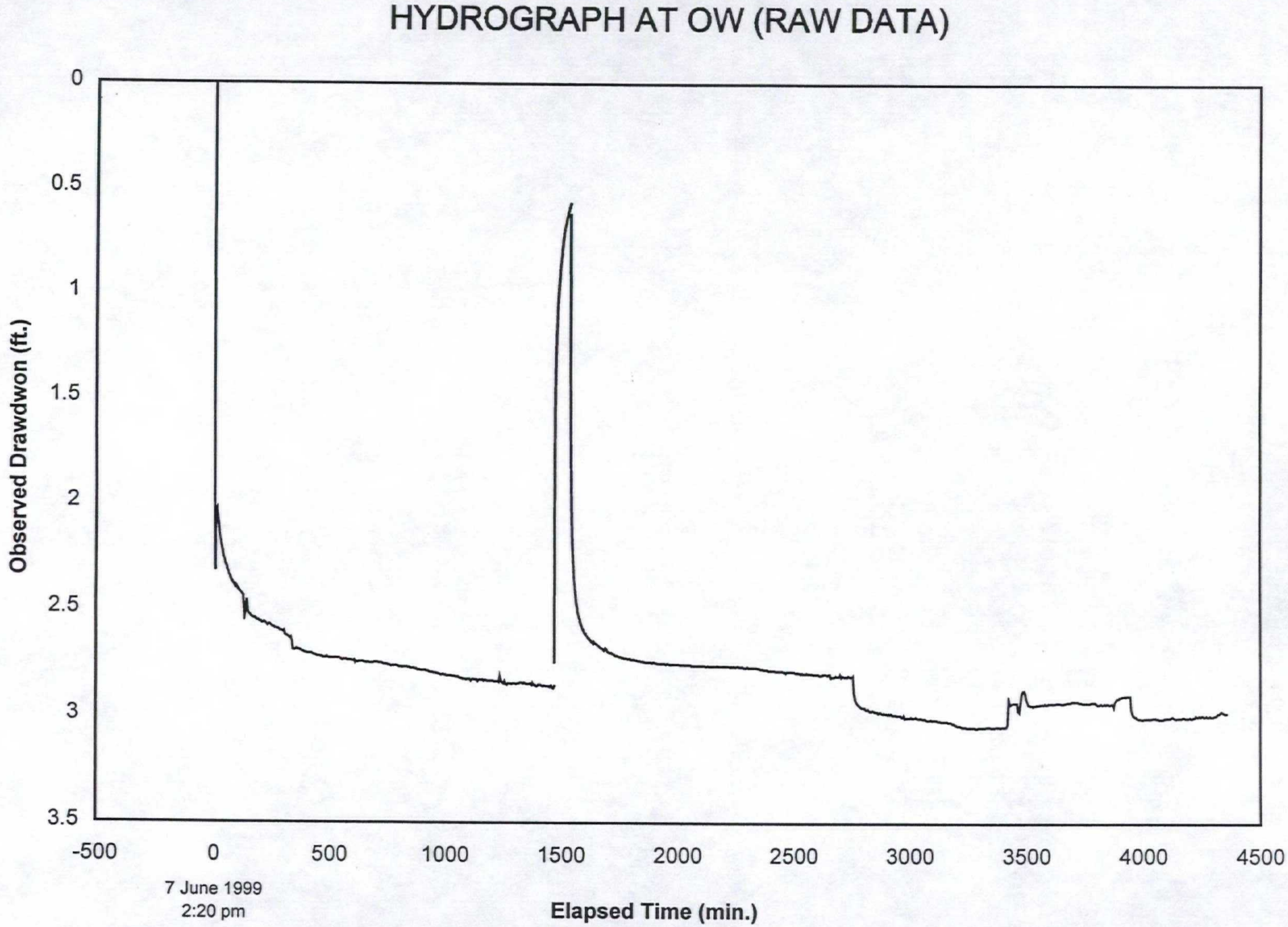
POTENTIOMETRIC SURFACE
SHALLOW UNCONFINED AQUIFER
6/7/99 (PRE-PUMPING)

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

PROJECT NO.	MR0015-15	FIGURE NO.	9-6
DOCUMENT NO.	-	FILE NO.	0015F111

NOTES:

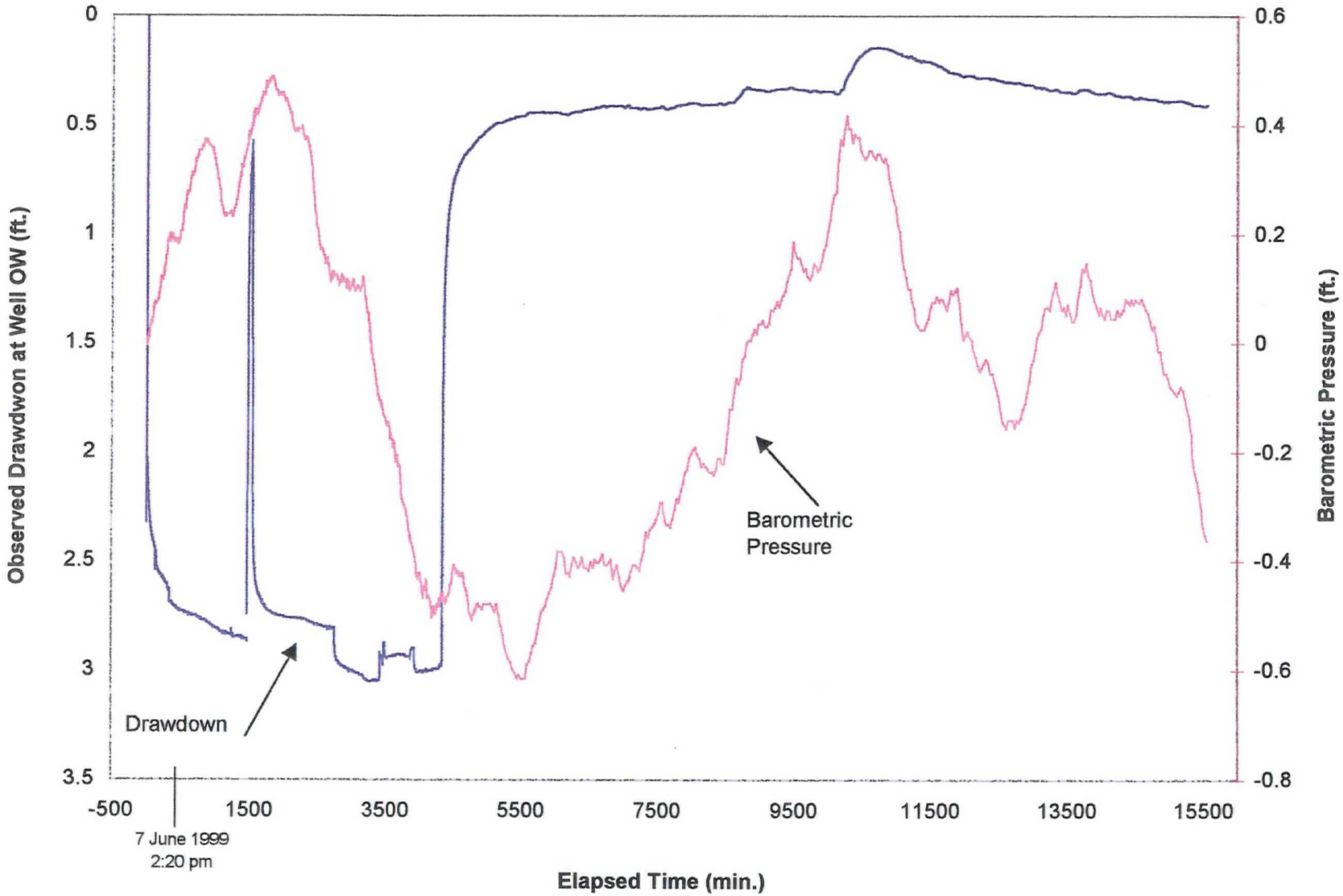
1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.
4. WETLAND AREAS ALONG THE WEST STREAM WERE DELINEATED BY PENNONI ASSOCIATES, INC. FROM FIELD SURVEYS CONDUCTED BETWEEN 5 FEB AND 13 FEB 1999; ALL OTHER WETLANDS ARE BASED ON AREAS DELINEATED BY TALBOT & ASSOCIATES, DECEMBER 1990.



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

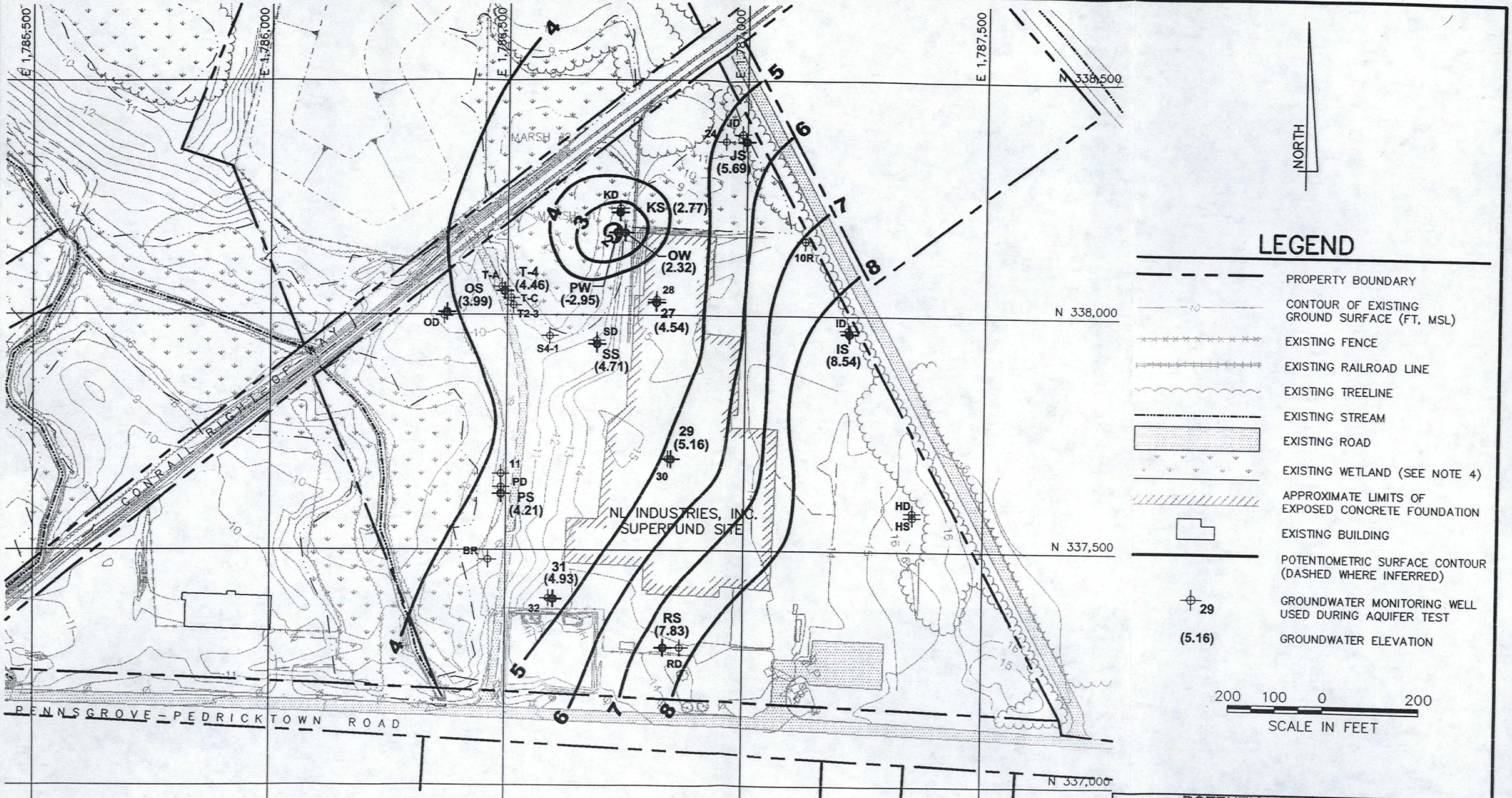
FIGURE NO.	9-7
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

DRAWDOWN AND BAROMETRIC PRESSURE VS. TIME



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9–8
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118



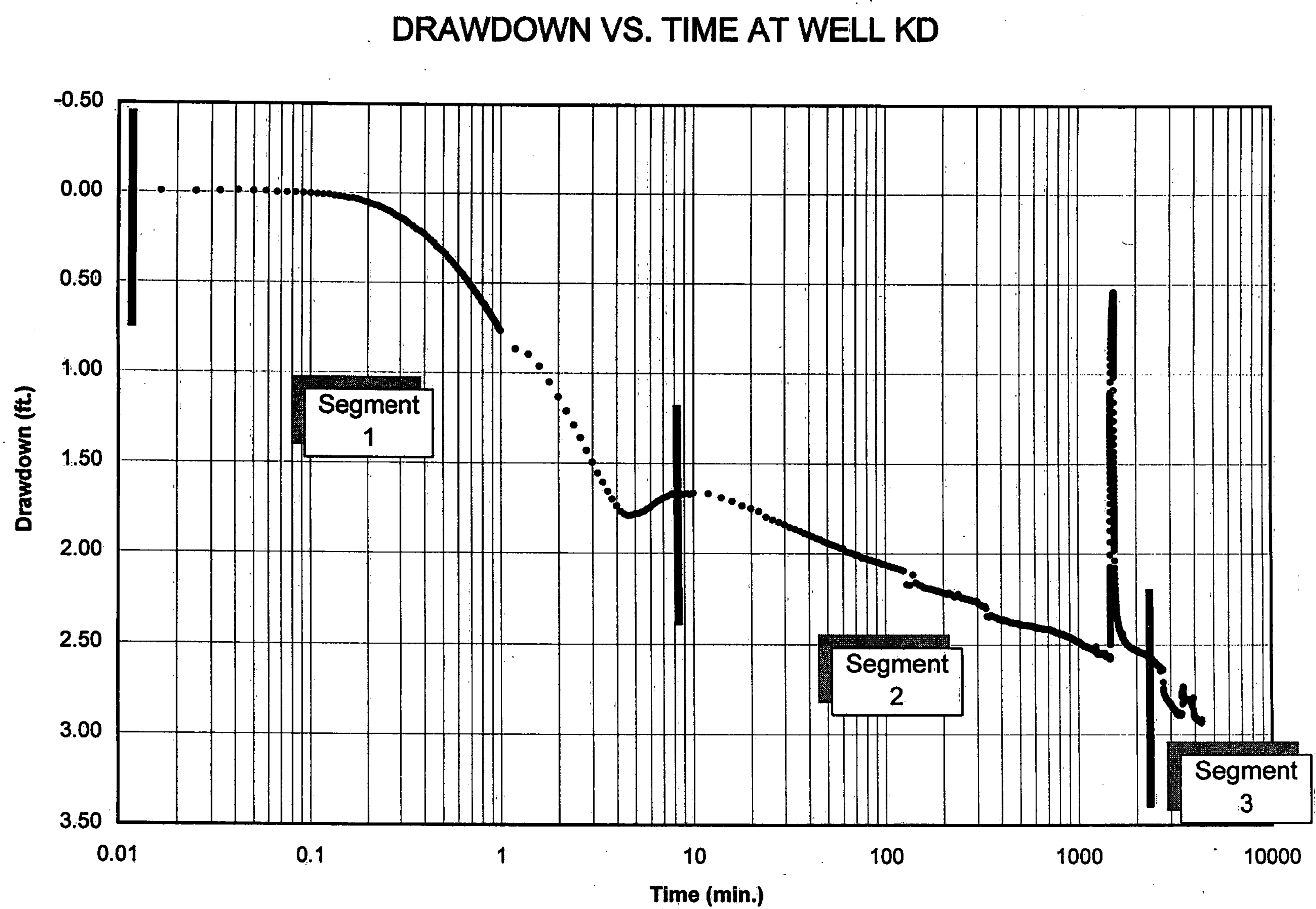
NOTES:

1. PROPERTY BOUNDARY IS APPROXIMATE AND IS BASED ON A TOPOGRAPHIC SURVEY PERFORMED BY ALBERT A. FRALINGER, BRIDGETON, NEW JERSEY, MAY 1990.
2. GROUND SURFACE ELEVATIONS ARE BASED ON AERIAL PHOTOGRAPHY AND GROUND SURVEY DATED MARCH 1996 BY OHM REMEDIATION SERVICES CORP.
3. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929. HORIZONTAL CONTROL BASED ON NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD), 1927.
4. WETLAND AREAS ALONG THE WEST STREAM WERE DELINEATED BY PENNONI ASSOCIATES, INC. FROM FIELD SURVEYS CONDUCTED BETWEEN 5 FEB AND 13 FEB 1999; ALL OTHER WETLANDS ARE BASED ON AREAS DELINEATED BY TALBOT & ASSOCIATES, DECEMBER 1990.

POTENTIOMETRIC SURFACE
SHALLOW UNCONFINED AQUIFER
6/10/99 (PUMPING)

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

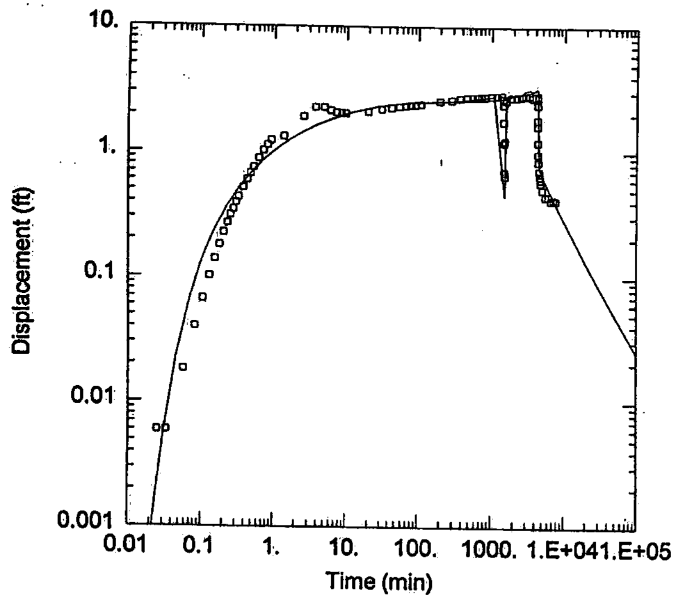
PROJECT NO.	MR0015-15	FIGURE NO.	9-9
DOCUMENT NO.	–	FILE NO.	0015F112



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9–10
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

NEWMAN ANALYSIS AT WELL OW



WELL TEST ANALYSIS

Data Set: J:\WPWORK\DUANE\NL\Pumping Test\OW-4.AQT
Date: 01/03/00 Time: 16:38:21

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 3828.6 gal/day/ft
S = 0.0005025
Sy = 0.04692
ß = 0.004301

AQUIFER DATA

Saturated Thickness: 23. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

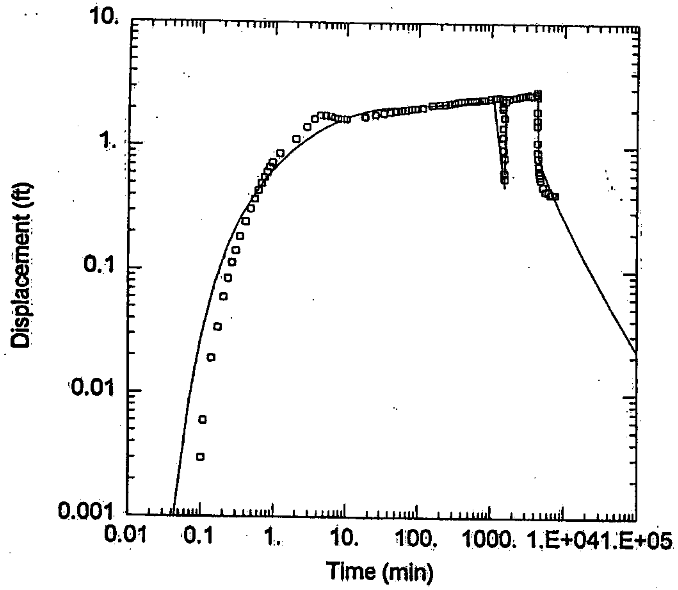
Observation Wells

Well Name	X (ft)	Y (ft)
▫ OW	0	16.75

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9–11
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

NEWMAN ANALYSIS AT WELL KD



WELL TEST ANALYSIS

Data Set: J:\WPWORK\DUANE\NL\Pumping Test\KD-4.AQT
Date: 01/04/00 Time: 10:18:00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 4269.3 gal/day/ft
S = 0.0002404
Sy = 0.01
ß = 0.01325

AQUIFER DATA

Saturated Thickness: 23.5 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW 1	0	0

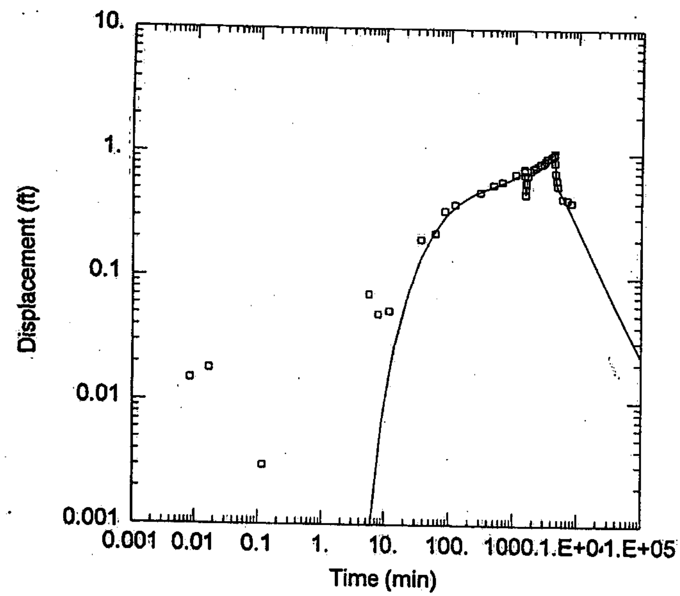
Observation Wells

Well Name	X (ft)	Y (ft)
▫ KD	0	36

GeoSyntec Consultants
COLUMBIA, MARYLAND

FIGURE NO.	9–12
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

NEWMAN ANALYSIS AT WELL MW-28



WELL TEST ANALYSIS

Data Set: J:\WPWORK\DUANE\NL\Pumping Test\28-4.AQT
Date: 01/04/00 Time: 10:17:38

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 4190.1 gal/day/ft
S = 0.001601
Sy = 0.0229
ß = 0.2702

AQUIFER DATA

Saturated Thickness: 18. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW 1	0	0

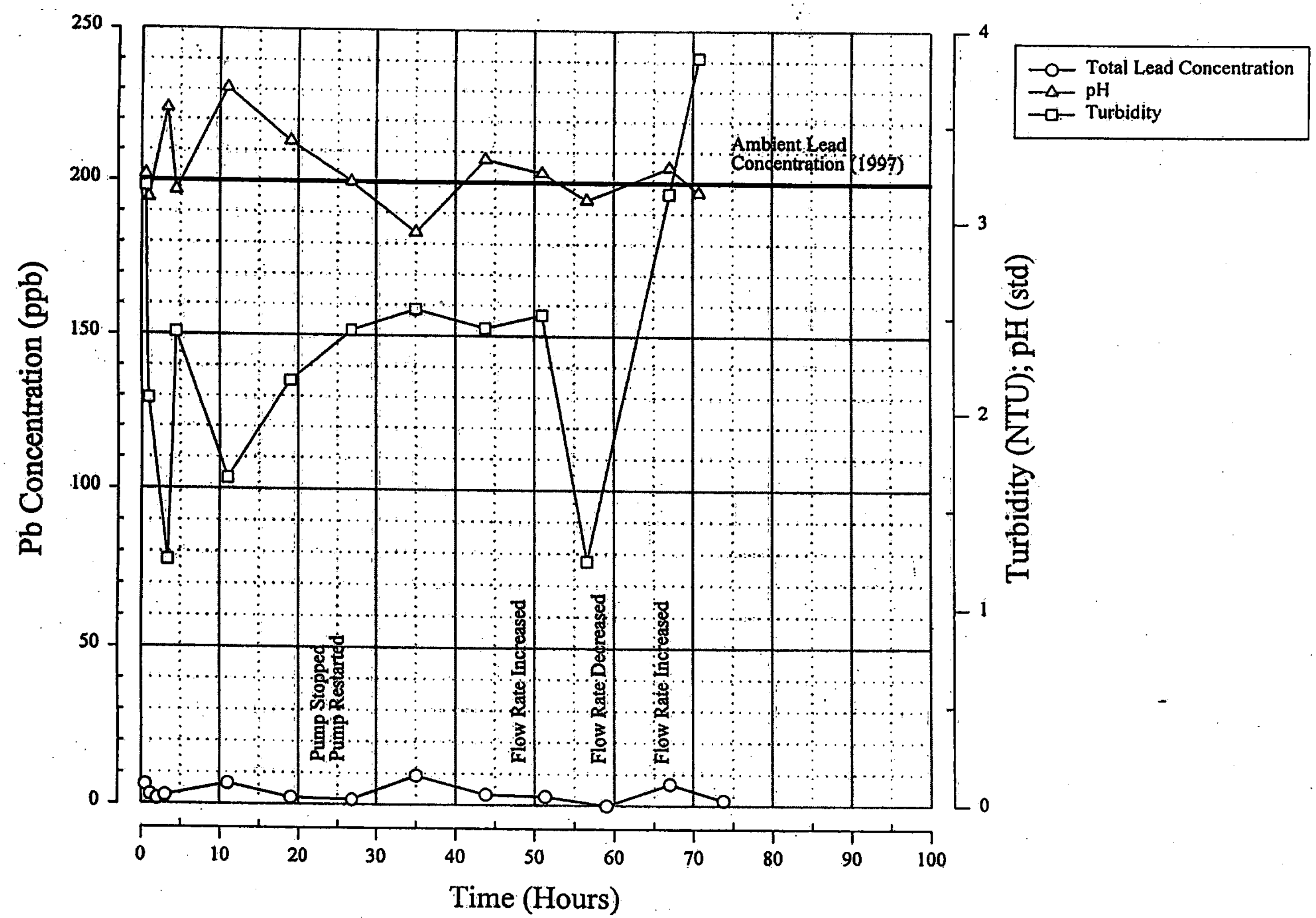
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-28	0	159

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9-13
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

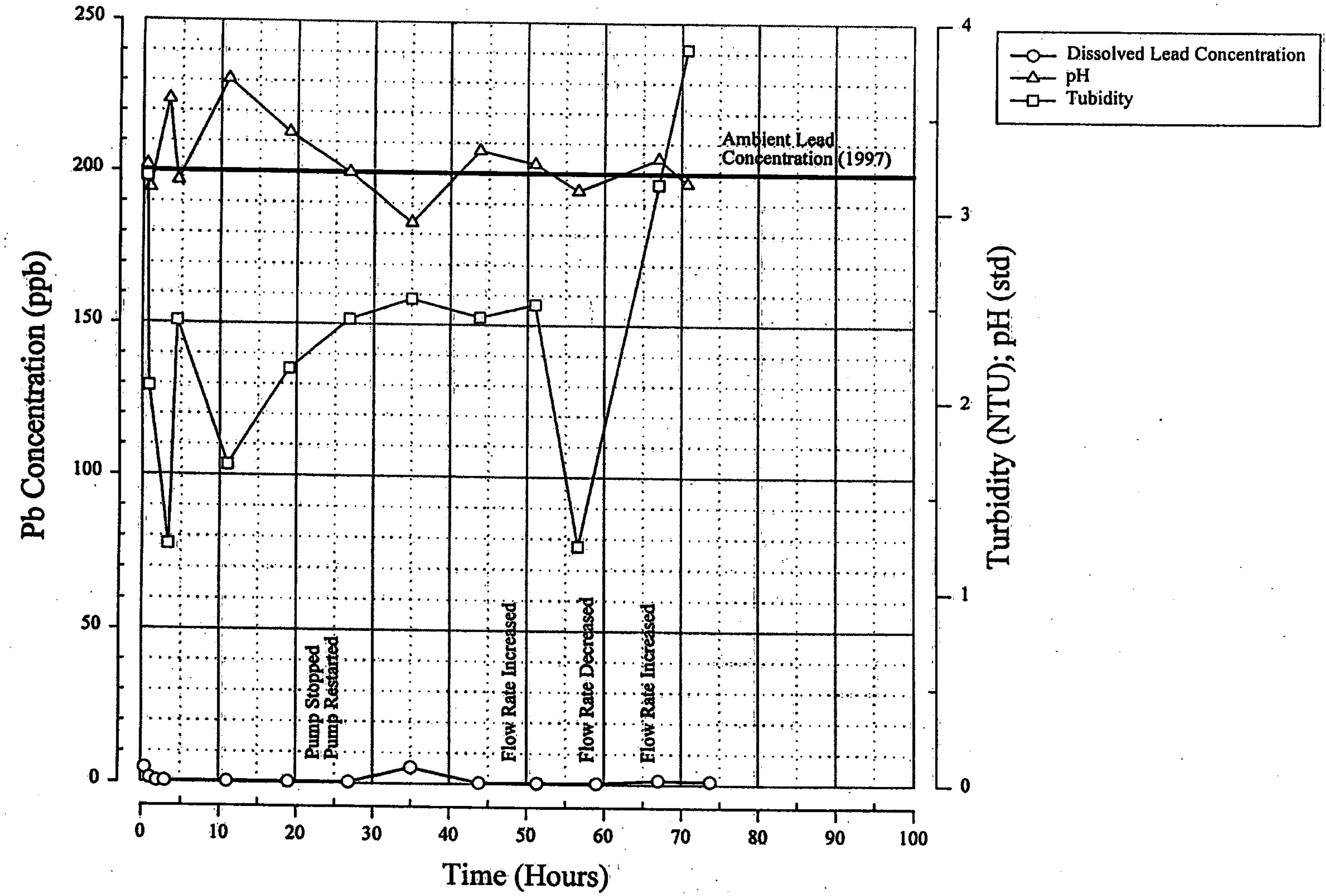
TOTAL LEAD MEASURED IN EFFLUENT DURING AQUIFER TEST



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

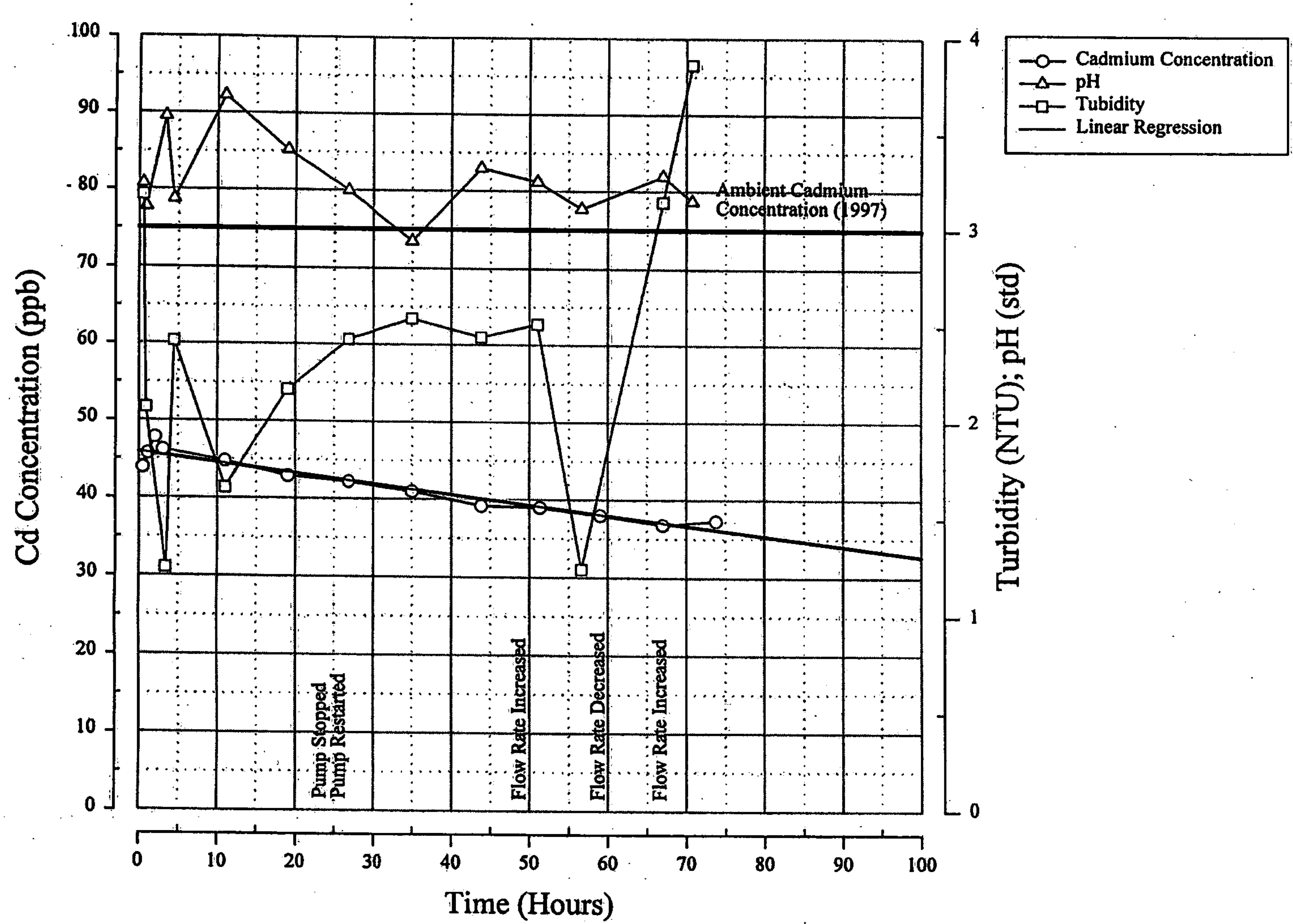
FIGURE NO.	9-14
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

DISSOLVED LEAD MEASURED IN EFFLUENT DURING AQUIFER TEST



GEOSYNTEC CONSULTANTS COLUMBIA, MARYLAND	FIGURE NO. 9–15
	PROJECT NO. ME0015–15
	DOCUMENT NO.
	FILE NO. 0015F118

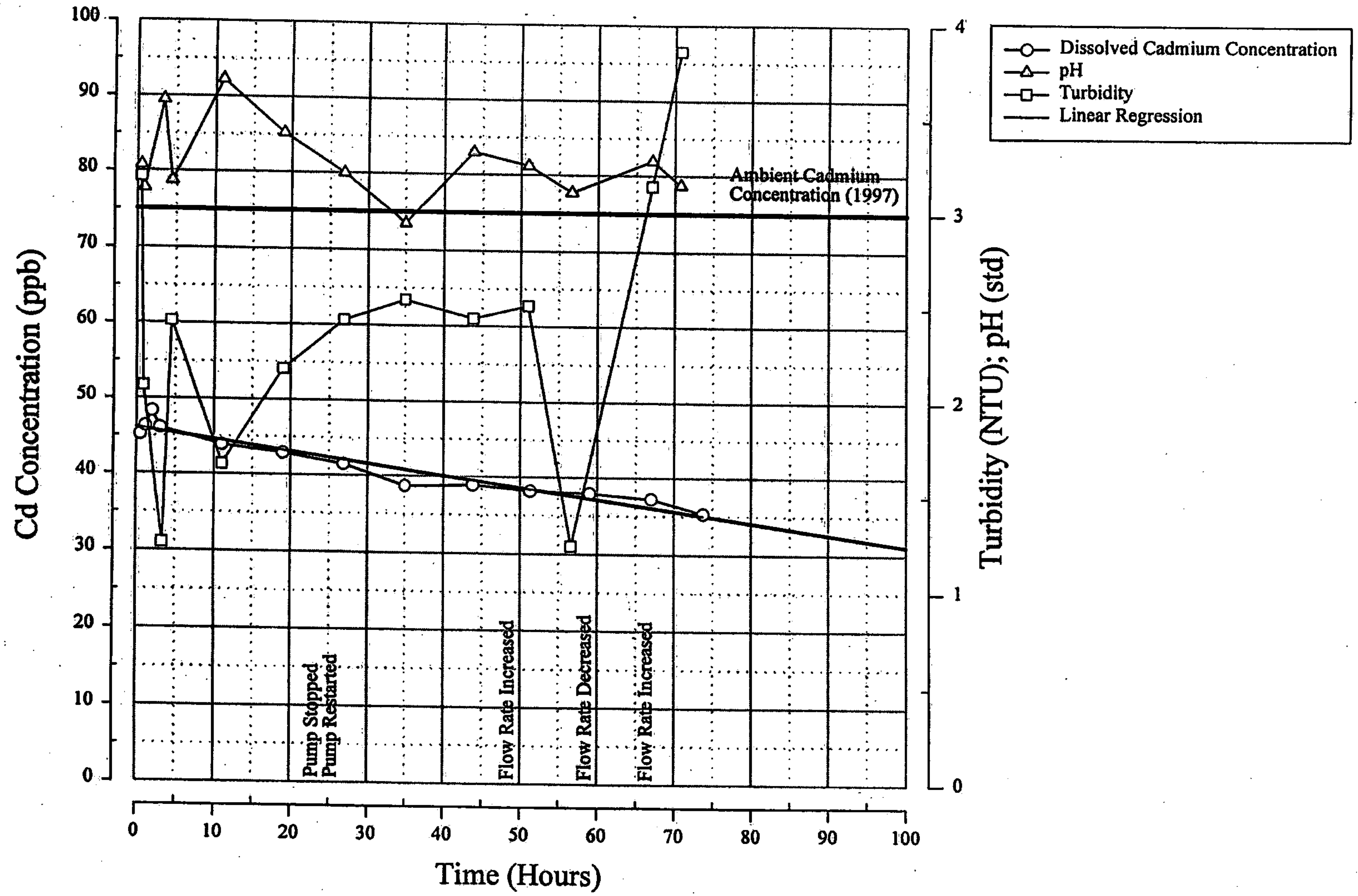
TOTAL CADMIUM MEASURED IN EFFLUENT DURING AQUIFER TEST



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9-16
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

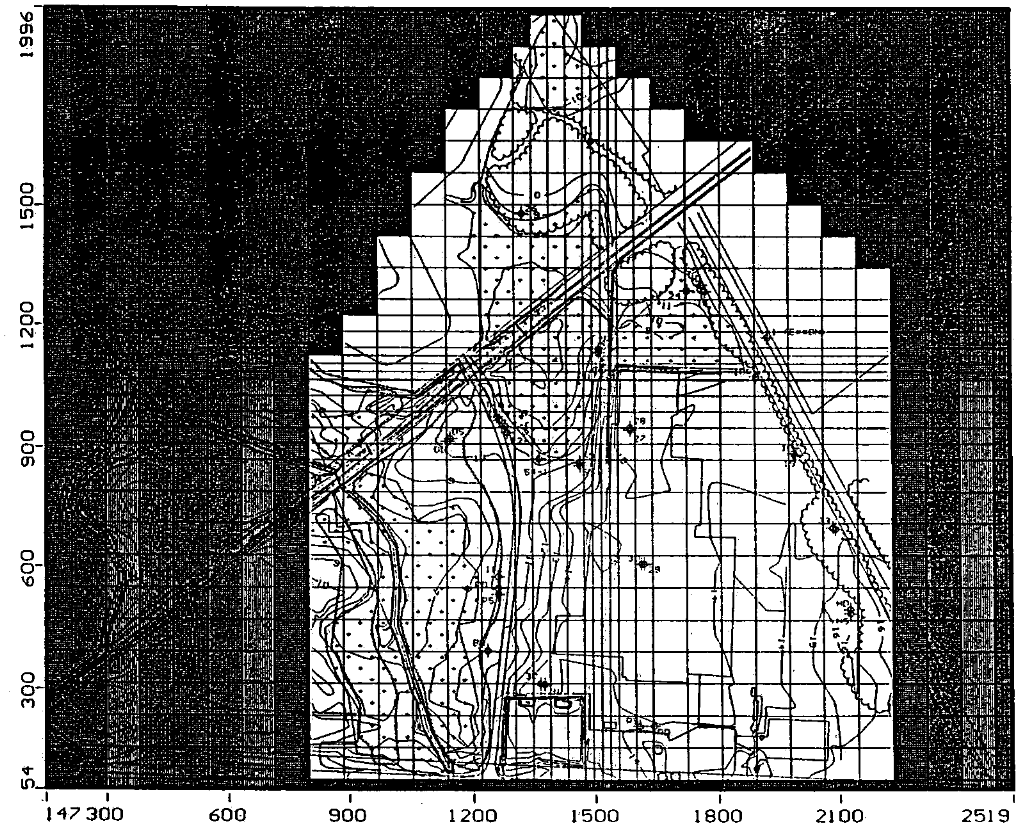
DISSOLVED CADMIUM MEASURED IN EFFLUENT DURING AQUIFER TEST



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	9–17
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

MODEL GRID



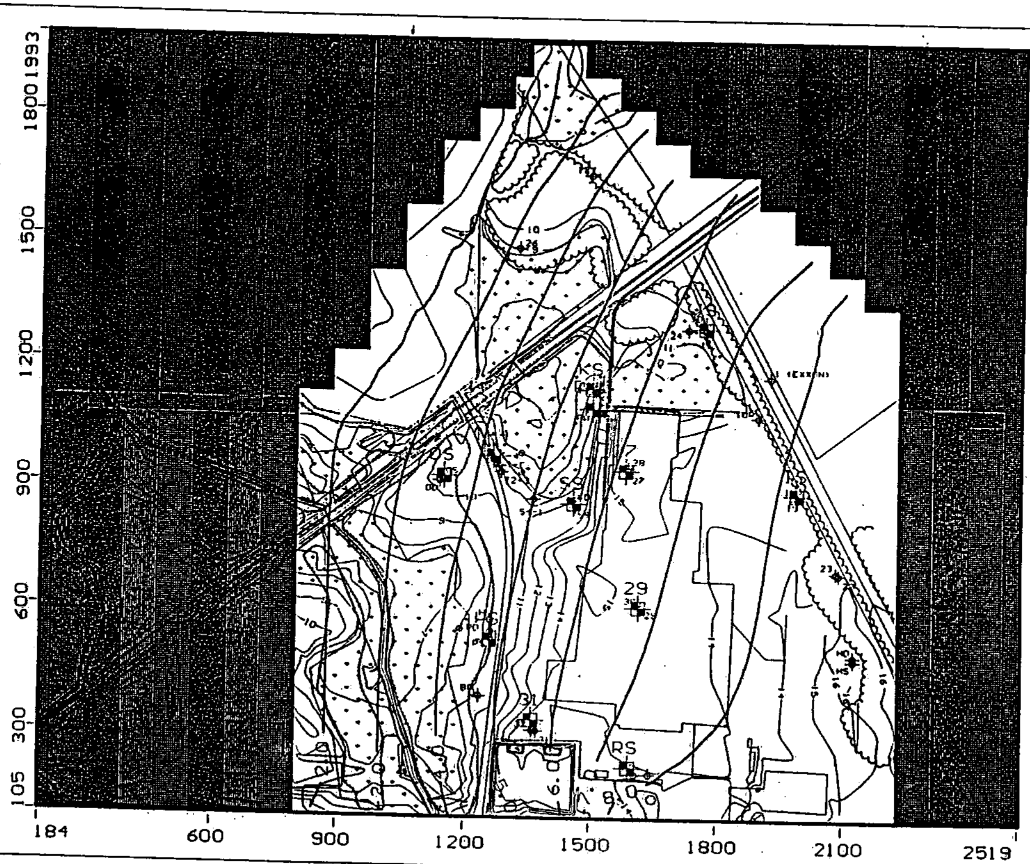
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\dc.vmf
Modeller: Carey
19 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 39 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	10-1
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

MODFLOW - SIMULATED WATER TABLE (NON-PUMPING)



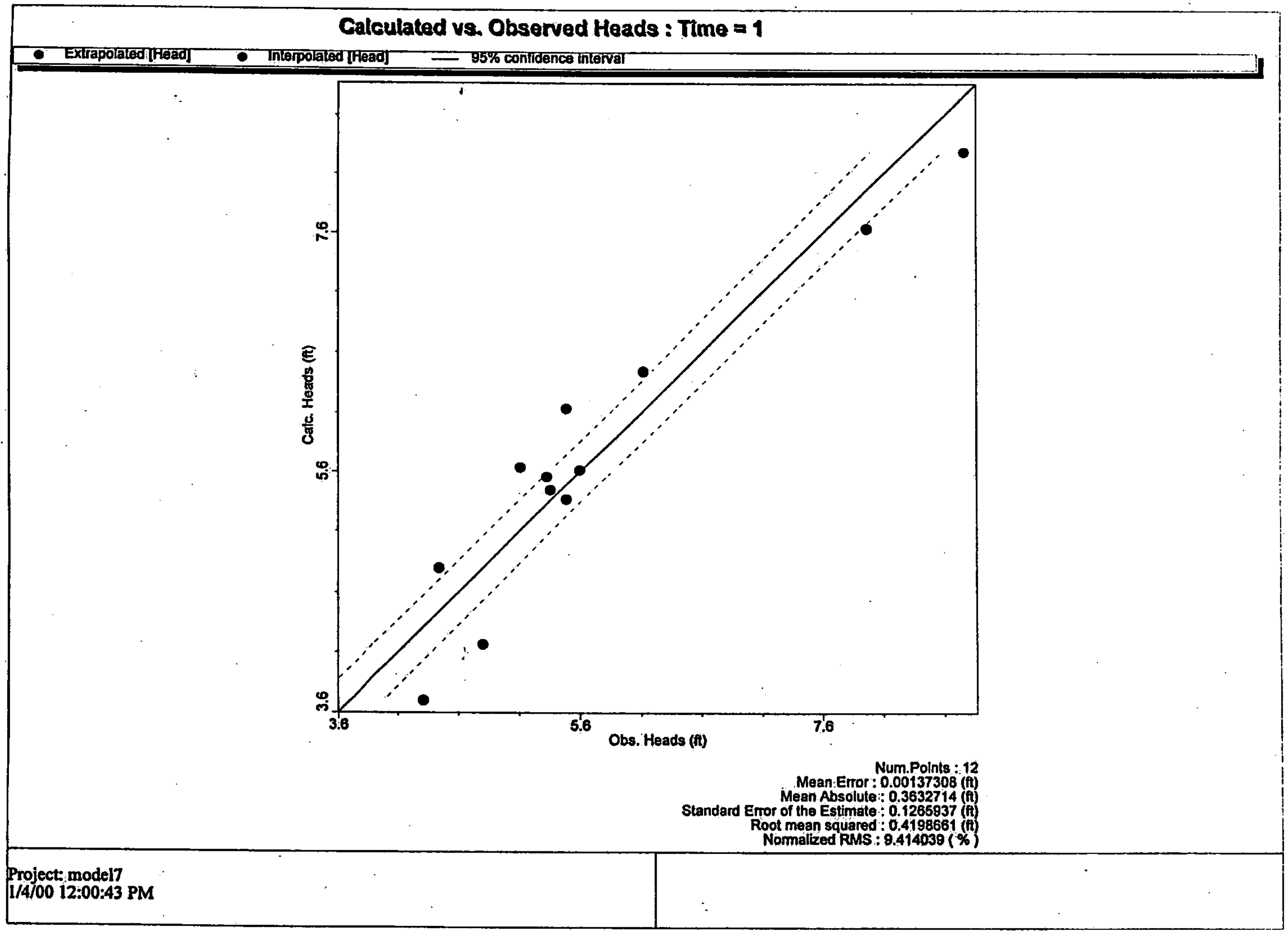
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\dc.vmf
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 39 NL: 2
Current Layer: 1

GeoSyntec Consultants
COLUMBIA, MARYLAND

FIGURE NO.	10-2
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

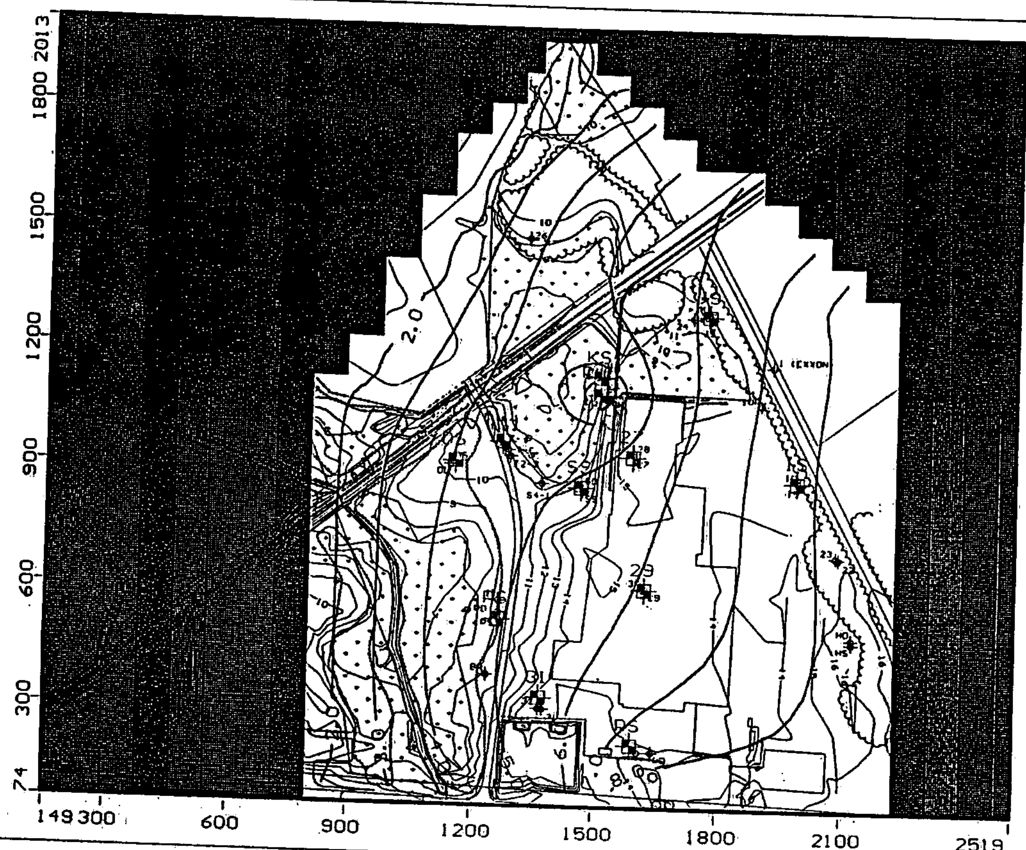
CALIBRATION GRAPH (NON-PUMPING)



GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	10–3
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

MODFLOW - SIMULATED WATER TABLE (PUMPING)



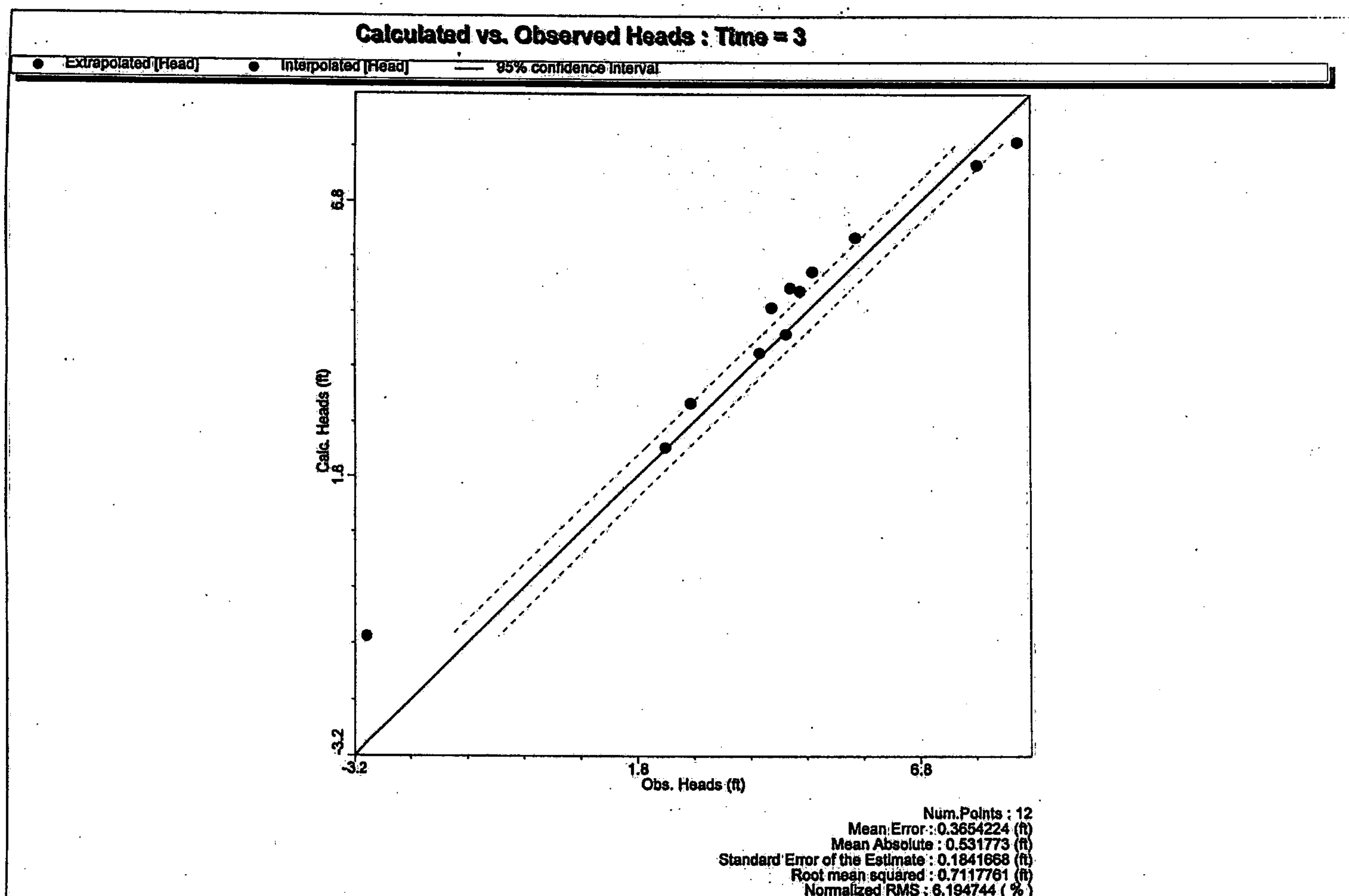
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\dcpump.vmf
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 39 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	10-4
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

CALIBRATION GRAPH (PUMPING)

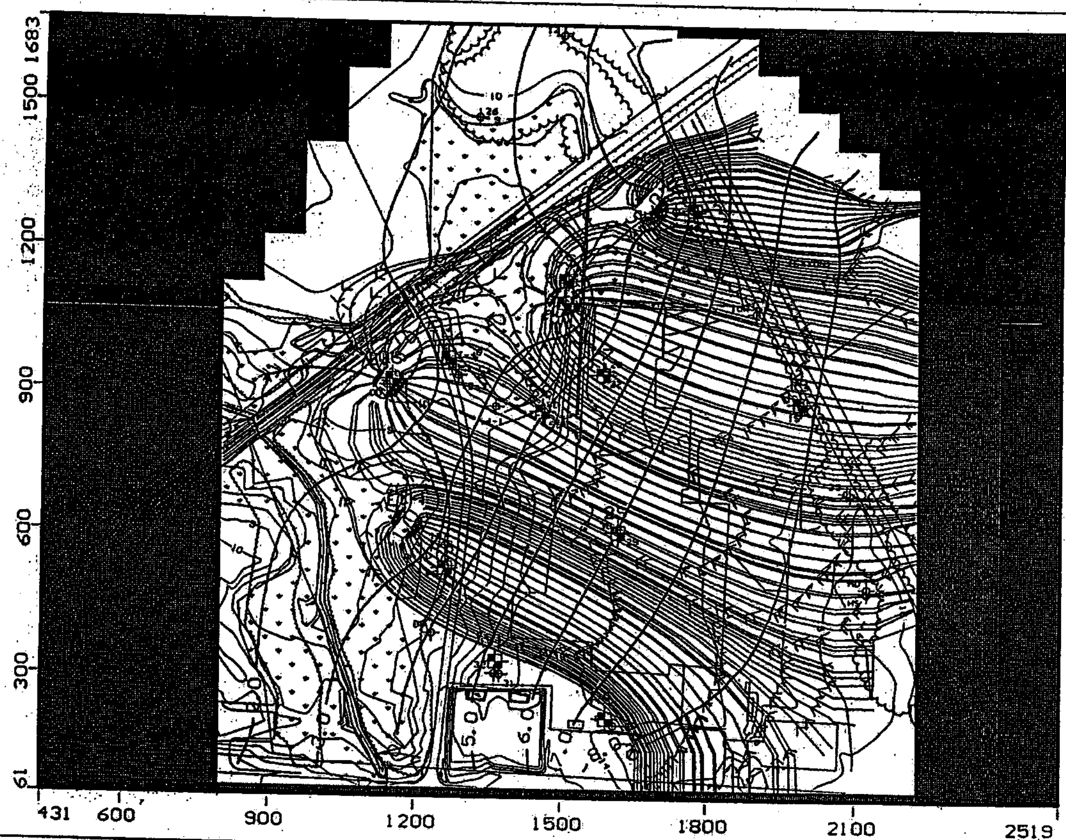


Project: pump7
1/4/00 12:07:19 PM

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	10-5
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

FIVE-YEAR CAPTURE ZONE SIMULATION (4 WELLS)



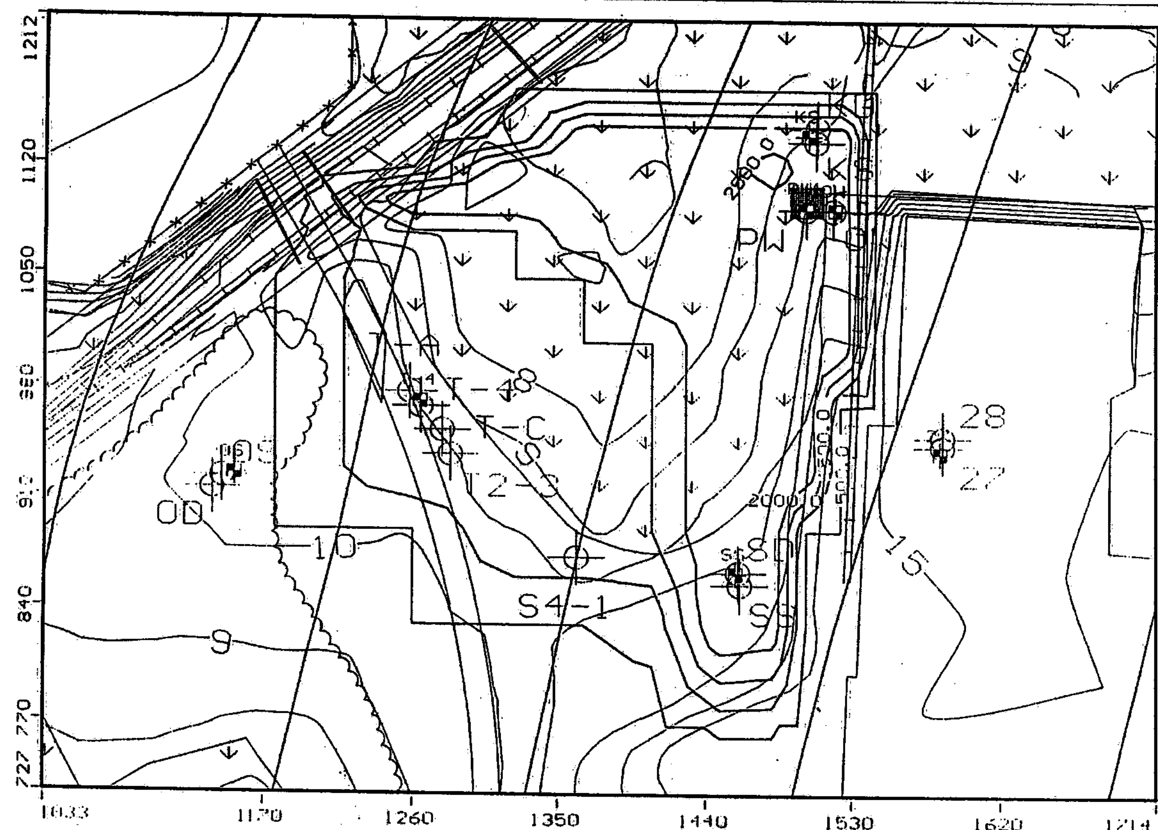
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\dcCAP_4well
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 44 NR: 49 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	10-6
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

SIMULATED LEAD CONCENTRATION IN 1989



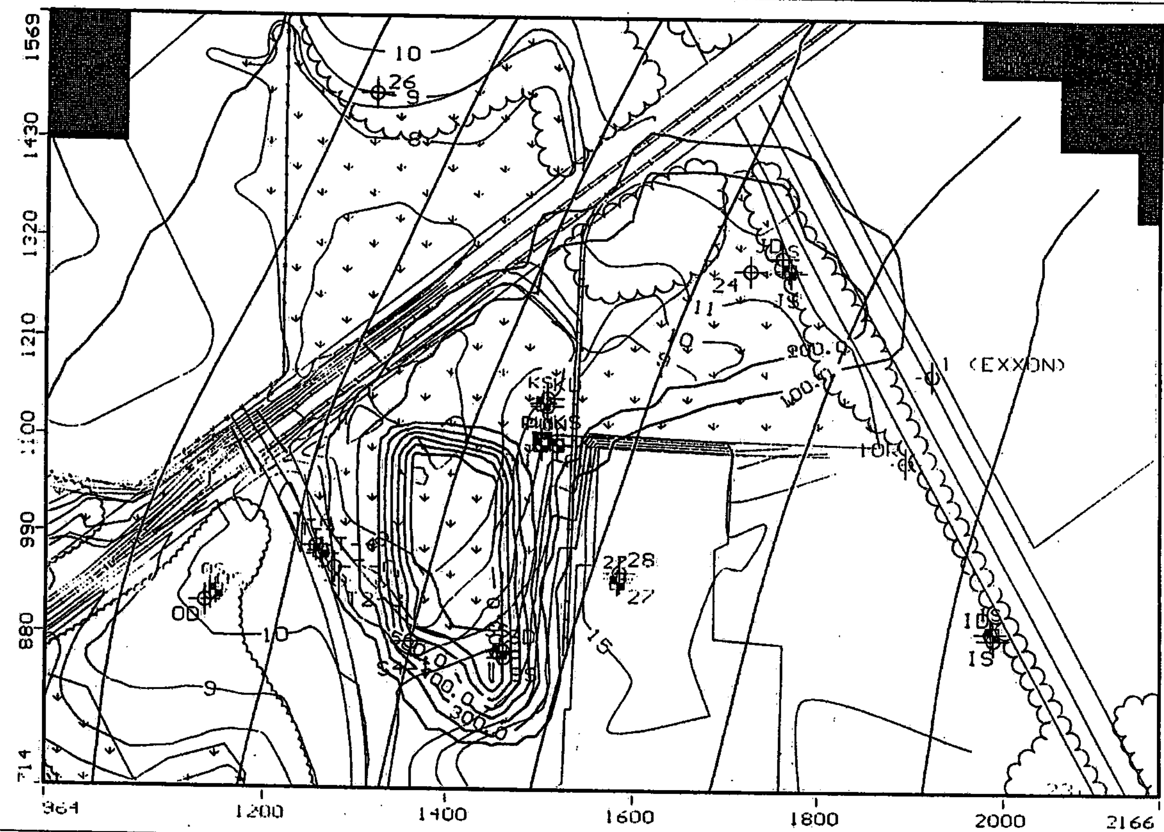
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\Pb1989
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1. (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 37 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	12-1
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

SIMULATED CADMIUM CONCENTRATION IN 1989



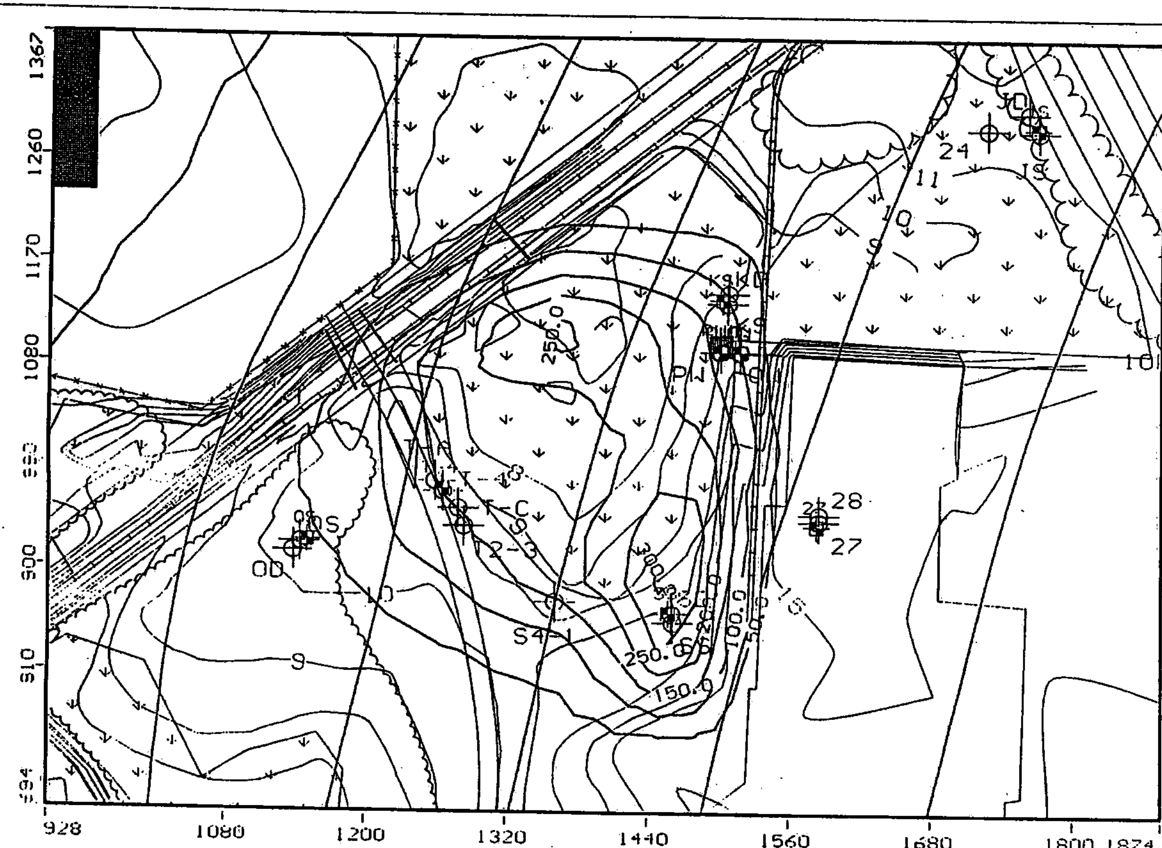
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\Cd1989
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 37 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	12-2
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

SIMULATED LEAD CONCENTRATION IN 1998



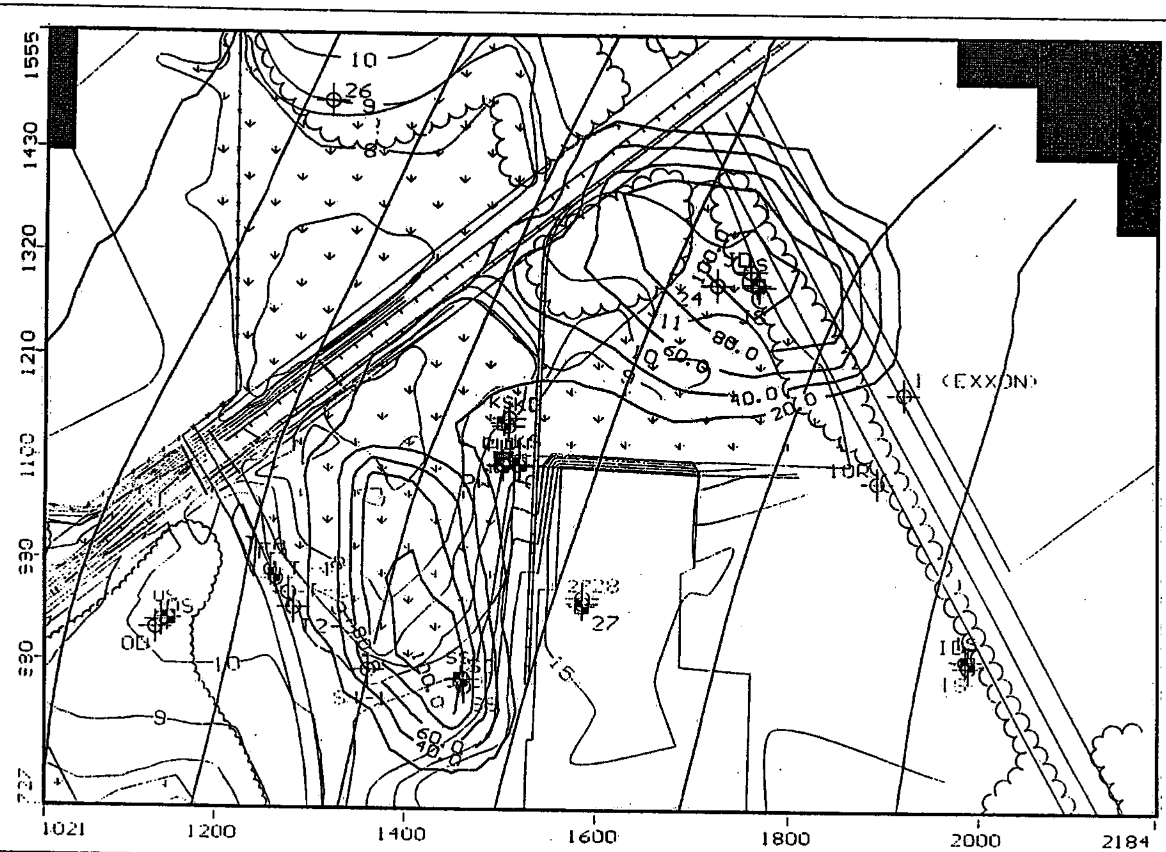
GeoSyntec
Project: NL Industries
Description: NL\Finalmodel\Pb1998
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 37 NL: 2
Current Layer: 1

GeoSyntec Consultants
COLUMBIA, MARYLAND

FIGURE NO.	12-3
PROJECT NO.	ME0015-15
DOCUMENT NO.	
FILE NO.	0015F118

SIMULATED CADMIUM CONCENTRATION IN 1998



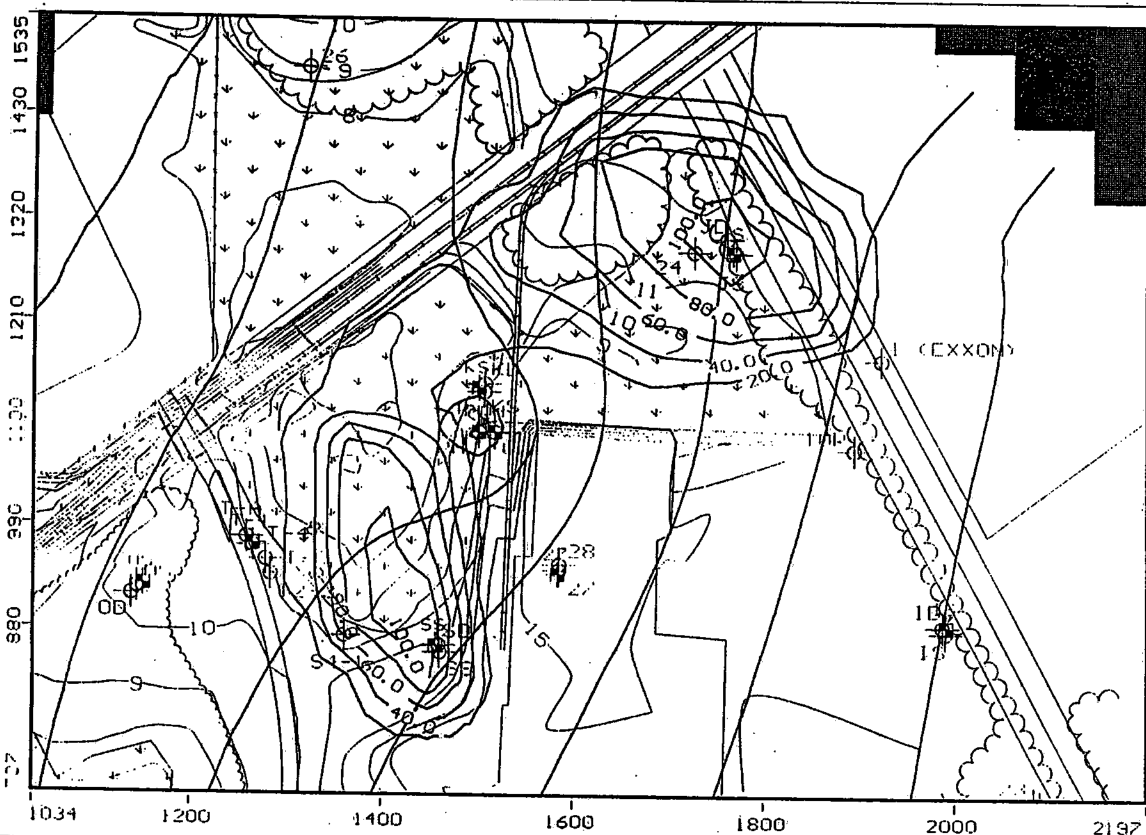
GeoSyntec
Project: NL Industries
Description: NL/Final/Cd1998
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 37 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	12–4
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

SIMULATED CADMIUM CONCENTRATION IN 1998 (WITH PUMPING)



GeoSyntec
Project: NL Industries
Description: NL\FinalModel\Cd1998_pump
Modeller: Carey
9 Jan 00

Visual MODFLOW v.2.8.1, (C) 1995–1999
Waterloo Hydrogeologic, Inc.
NC: 37 NR: 37 NL: 2
Current Layer: 1

GEOSYNTEC CONSULTANTS
COLUMBIA, MARYLAND

FIGURE NO.	12–5
PROJECT NO.	ME0015–15
DOCUMENT NO.	
FILE NO.	0015F118

APPENDIX A

LITHOLOGIC LOGS

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	22
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-61
Start Date:	17-Jul-98	**Driller:**	J. Corron
Completion Date:	20-Jul-98	**Geologist:**	P. Botek
Ground Elevation:	15 ft above msl (est.)	**Depth to Groundwater Wile Drilling:**	8 ft bgs
Depth of Boring:	16 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description (Lithologic description based on examination of split-spoon samples obtained from corresponding well 23)
15	0			
14	1			(0-8" Light gray to brown SILT Loam, highly organic).
13	2			Light gray to brown SILTY SAND (SM).
12	3			
11	4			
10	5			Pale gray to orange brown SILTY SAND (SM) at 5 ft bgs.
9	6			
8	7			Dark gray SILTY SAND (SM), silt increasing with depth, some medium sand grains.
7	8			Light gray SILTY CLAY (CL), very stiff.
6	9			Light gray and orange brown SILTY CLAY (CL), mottled, stiff - very stiff.
5	10			
4	11			
3	12			
2	13			
1	14			
0	15			
-1	16			Light brown to orange brown SAND (SM), medium grain, some coarse grains, some silt.

- END OF BORING AT 16 FT BGS -

LITHOLOGIC LOG

Site Name: NL Industries Inc. Superfund Site
Location: Pedricktown, New Jersey

Start Date: 17-Jul-98
Completion Date: 17-Jul-98

Ground Elevation: 15 ft above msl (est.)
Depth of Boring: 34 ft bgs

Drilling Methods: 4.25" ID Hollow Stem Augers with continuous split-spoon sampling

Boring Number: 23
Drilling Firm: Hardin-Huber, Inc.
Type of Drill: Mobil B-61
Driller: J. Corron
Geologist: P. Botek

Depth to Groundwater Wile Drilling: 8 ft bgs

Well Installed: X
Abandoned:

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
15	0			
14	1	0 - 2	2,2,1,2	(0-8" Light gray to brown SILT Loam, highly organic).
13	2			Light gray to brown SILTY SAND (SM).
12	3	2 - 4	4,5,6,11	
11	4			
10	5	4 - 6	5,7,7,12	Pale gray to orange brown SILTY SAND (SM) at 5 ft bgs.
9	6			
8	7	6 - 8	6,7,9,11	Dark gray SILTY SAND (SM), silt increasing with depth. some medium sand grains.
7	8			Light gray SILTY CLAY (CL), very stiff.
6	9	8 - 10	6,8,8,10	Light gray and orange brown SILTY CLAY (CL), mottled, stiff - very stiff.
5	10			
4	11	10 - 12	4,4,5,8	
3	12			
2	13	12 - 14	3,4,6,8	
1	14			
0	15	14 - 16	6,14,15,21	
-1	16			Light brown to orange brown SAND (SM), medium grain, some coarse grains, some
-2	17	16 - 18	5,17,13,21	silt, wet.
-3	18			
-4	19	18 - 20	8,16,27,26	Pale white to yellow brown SAND (SM), medium to coarse grain, few fines.
-5	20			
-6	21	20 - 22	7,15,12,12	Pale gray SAND (SM), medium to coarse grain, some pink grains, few silt.
-7	22			
-8	23	22 - 24	7,9,18,23	
-9	24			Gray and light brown CLAY (CL), mottled, stiff.
-10	25	24 - 26	7,12,12,20	Pale gray SAND (SM), medium to coarse grain, some silt, some well rounded
-11	26			gravel.
-12	27	26 - 28	15,16,23,40	Pale gray SAND (SW - SM), coarse, some well rounded gravel, some fines. Pale
-13	28			gray to orange brown SILTY SAND (SM) from 27.3 to 28 ft bgs.
-14	29	28 - 30	10,10,8,11	Pale white to gray SAND (SM), fine to medium grain, some gravel, fining with
-15	30			depth. Pale gray and yellow brown SILTY SAND (SM) from 29 to 30 ft bgs.
-16	31	30 - 32	7,8,9,13	Light brown SILTY SAND (SM).
-17	32			

-18 / -19	33 / 34	32 - 34	7,10,14,18	Light brown, red, and gray CLAY (CL), mottled, stiff to very stiff.
				- END OF BORING AT 34 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	24
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-80 (ATV)
Start Date:	9-Jul-98	**Driller:**	J. Corron
Completion Date:	16-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	11 ft above msl (est.)	**Depth to Groundwater Wile Drilling:**	6 ft bgs
Depth of Boring:	73 ft bgs		
Drilling Methods:	Mud Rotary (12" bit)	**Well Installed:**	X
	w/ continuous split-spoon sampling	**Abandoned:**	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
11 ft	0			
10	1	0 - 2	6,7,7,7	(0-6" Topsoil - Strong brown with roots, highly organic).
9	2			Strong brown to yellowish brown SAND (SM), very fine grain, loose, dry.
8	3	2 - 4	8,11,14,16	Strong brown SAND (SM), very fine to fine grain, loose, few gravel, dry.
7	4			
6	5	4 - 6	8,20, 35, 25	Strong brown SAND and SILT (SM), fine to very coarse quartz grains, few gravel,
5	6			many dark grains. loose. wet. [Difficult drilling through gravel].
4	7	6 - 8	7,9,18,21	One-inch thick layer of gravel at 6 ft bgs. [Difficult drilling through gravel].
3	8			Light gray CLAY (CL) interbedded with pink to yellowish CLAYED SAND (SC).
2	9	8 - 10	12,15,18,20	Clays are dense, thick, very stiff, and contain iron oxide staining. Sands are fine to
1	10			coarse grain, containing some dark fines and few pink grains. Few gravel present at
0	11	10 - 12	9,10,15,14	13 ft bgs.
-1	12			
-2	13	12 - 14	4,7,10,12	
-3	14			
-4	15	14 - 16	7,10,13,13	
-5	16			
-6	17	16 - 18	4,6,11,10	
-7	18			
-8	19	18 - 20	15,6,6,6	
-9	20			
-10	21	20 - 22	3,6,5,5	
-11	22			
-12	23	22 - 24	NR	
-13	24			
-14	25	24 - 26	4,7,11,15	White to light gray SAND and GRAVEL (SW), fine to coarse grain sands, well
-15	26			sorted, few fines, interbedded with CLAY (CL), stiff, dense, iron-oxide stained.
-16	27	26 - 28	7,10,11,11	Red, white, and yellowish-brown CLAY (CL), mottled, stiff, hard.
-17	28			
-18	29	28 - 30	13,15,18,20	
-19	30			SAND and GRAVEL (SW), 0.5-inch diameter gravels.

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	24
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-80 (ATV)
Start Date:	9-Jul-98	**Driller:**	J. Corron
Completion Date:	16-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	11 ft above msl (est.)	**Depth to Groundwater Wile Drilling:**	6 ft bgs
Depth of Boring:	73 ft bgs		
Drilling Methods:	Mud Rotary (12" bit)	**Well Installed:**	X
	w/ continuous split-spoon sampling	**Abandoned:**	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
-19 #	30			
-20	31	30 - 32	6,12,18,20	Red, white, and yellowish-brown CLAY (CL), mottled, stiff, hard.
-21	32			
-22	33	32 - 34	4,7,10,10	Red, white, and yellowish-brown CLAY (CL), mottled, stiff, hard, becoming predominantly red and white with depth.
-23	34			
-24	35	34 - 46	5,9,13,15	Red, white, and yellowish-brown CLAY (CL), mottled, stiff, hard, becoming predominantly red with depth.
-25	36			
-26	37	36 - 38	7,8,14,18	
-27	38			
-28	39	38 - 40	6,11,26,24	
-29	40			
-30	41	40 - 42	6,10,16,21	Red and light gray, and gray and yellowish-brown CLAY (CL), mottled, stiff, hard, grading toward a SILT(ML) present at 42.5 ft bgs.
-31	42			
-32	43	42 - 44	8,29,33,30	Gray, yellowish-brown, and brown SILT (ML), some dark grain laminations at 44 - 46 ft bgs.
-33	44			
-34	45	44 - 46	20,24,29,40	
-35	46			
-36	47	46 - 48	25,29,50/5	Red SILT (ML) to 46.1 ft bgs grading to a reddish-brown SILTY SAND (SM) to 46.3 ft bgs grading to a light gray SAND (SM), fine to carse grain.
-37	48			
-38	49	48 - 50	25,42,33,28	Brown SAND and GRAVEL (SW - SM), coarse grain sands, appreciable fines.
-39	50			
-40	51	50 - 52	16,21,21,30	Reddish-brown to brown SAND and GRAVEL (SW - SM), coarse grain sands, appresicable fines, fines changing color to pale yellow and light gray at 52 ft bgs.
-41	52			
-42	53	52 - 54	25,34,38,40	
-43	54			
-44	55	54 - 56	11,15,17,22	Light gray and yellowish-brown CLAY (CL), mottled, interbedded with SAND and GRAVEL (SW), coarse grain sands to 55 ft bgs, grading to light gray SILT (ML) characterized by dark grain laminae, becoming clayey at 57.5 ft bgs.
-45	56			
-46	57	56 - 58	13,13,11,18	
-47	58			
-48	59	58 - 60	11,25,39,43	Light gray SILT (ML) interbedded with CLAY (CL), 2-inch thick seams.
-49	60			

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	24
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-80 (ATV)
Start Date:	9-Jul-98	**Driller:**	J. Corron
Completion Date:	16-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	11 ft above msl (est.)	**Depth to Groundwater Wile Drilling:**	6 ft bgs
Depth of Boring:	73 ft bgs		
Drilling Methods:	Mud Rotary (12" bit)	**Well Installed:**	X
	w/ continuous split-spoon sampling	**Abandoned:**	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
-49 #	60			
-50	61	60 - 62	9,12,13,16	Light gray SILT (ML) interbedded with CLAY (CL), 2-inch thick seams,
-51	62			percentage of clay increasing with depth.
-52	63	62 - 64	10,18,26,29	
-53	64			
-54	65	64 - 66	7,19,20,30	Gray and yellowish-brown SILT (ML) interbedded with CLAY (CL), mottled.
-55	66			
-56	67	66 - 68	15,13,16,25	Light gray SILTY CLAY (CL) and CLAYEY SAND (SC) to 66.5 ft bgs, grading
-57	68			to a light gray SILT (ML) and yellow-brown and gray SILTY CLAY (CL), mottled.
-58	69	68 - 70	13,26,26,30	Pink and white GRAVEL and SAND (SW), coarse grain sands, mixed with yellow-
-59	70			brown and light gray CLAY (CL), mottled, stiff, and strong brown to pink SAND
-60	71	70 - 72	17,33,30,36	(SW - SM) fine to coarse grain, containing some gravel and fines.
-61	72			
-62	73	72 - 74	50,50/5	Pink quartz SAND (SW - SM), with some gravel, and appreciable fines.
-63	74			
				- END OF BORING AT 73 FT BGS -
				(split-spoon sample to 74 ft bgs; drill only to 73 ft bgs)

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	26
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 ATV
Start Date:	20-Jul-98	**Driller:**	D. Taylor
Completion Date:	20-Jul-98	**Geologist:**	J. Moore
Ground Elevation:	10 ft above msl (est.)	**Depth to Groundwater Wile Drilling:**	8 ft bgs
Depth of Boring:	22 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
10	0			Fine to coarse SAND
9	1			
8	2			
7	3			
6	4			
5	5			Coarse SAND
4	6			
3	7			
2	8			
1	9			SILTY SAND and CLAY
0	10			
-1	11			coarse SAND
-2	12			
-3	13			
-4	14			
-5	15			
-6	16			
-7	17			Fine to coarse SAND and SILT
-8	18			
-9	19			SILTY SAND and CLAY
-10	20			
-11	21			Fine to coarse SAND and SILT
-12	22			red and white mottled CLAY at bottom of spoon
				- END OF BORING AT 22 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	27
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-61
Start Date:	16-Jul-98	**Driller:**	J. Corron
Completion Date:	16-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	20 ft above msl (est.)	**Depth to Groundwater While Drilling:**	8 ft bgs
Depth of Boring:	15 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description (Lithologic description based on examination of split-spoon samples obtained from corresponding well 28)
20 #	0			Concrete, rebar, and asphalt (FILL).
19	1			
18	2			
17	3			Medium to dark brown SILTY SAND (SM).
16	4			
15	5			
14	6			
13	7			
13	8			
11	9			Light brown to gray SAND (SM), with silt, fine to medium grain sands, few coarse gravel and pebbles, wet.
10	10			
9	11			
8	12			
7	13			
6	14			
5	15			
				- END OF BORING AT 15 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	28
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-61
Start Date:	16-Jul-98	**Driller:**	J. Corron
Completion Date:	16-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	20 ft above msl (est.)	**Depth to Groundwater While Drilling:**	8 ft bgs
Depth of Boring:	30 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split-spoon sampling	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
20	0			
19	1	0 - 2		Concrete, rebar, and asphalt (FILL).
18	2			
17	3	2 - 4	13,14,16,23	Medium to dark brown SILTY SAND (SM).
16	4			
15	5	4 - 6	13,14,17,27	
14	6			
13	7	6 - 8	13,30,20,34	
12	8			
11	9	8 - 10	5,9,11,10	Light brown to gray SAND (SM), with silt, fine to medium grain sands, few coarse gravel and pebbles, wet.
10	10			
9	11	10 - 12	6,11,14,20	
8	12			
7	13	12 - 14	8,12,15,19	
6	14			
5	15	14 - 16	10,10,12,14	
4	16			Light brown SAND (SW-SM), fine to medium grain, with appreciable silt, interbedded with gray and yellowish-brown mottled CLAY (CL) and coarser sands and gravel (2-inch to 3-inch diameter) containing some pink grains.
3	17	16 - 18	5,5,6,9	
2	18			
1	19	18 - 20	3,5,6,7	
0	20			
-1	21	20 - 22	7,7,7,6	Pale white SAND (SP), fine to coarse grain, some pink grains.
-2	22			
-3	23	22 - 24	6,6,7,6	
-4	24			
-5	25	24 - 26	3,3,4,2	
-6	26			
-7	27	26 - 28	3,4,6,9	Gray to organge-brown SAND (SP), medium grain, and red and white CLAY(CL), mottled.
-8	28			
-9	29	28 - 30	2,3,6,8	Red and white CLAY (CL), mottled.
-10	30			

- END OF BORING AT 30 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	29
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-61
Start Date:	14-Jul-98	**Driller:**	J. Corron
Completion Date:	14-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	18 ft above msl (est.)	**Depth to Groundwater While Drilling:**	9 ft bgs
Depth of Boring:	15.5 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description (Lithologic description based on examination of split-spoon samples obtained from corresponding well 30)
18	0			
17	1			Concrete and asphalt (FILL)
16	2			
15	3			
14	4			
13	5			Dark yellowish-brown SILTY SAND (SM), moist.
12	6			
11	7			
10	8			
9	9			Dark yellowish-brown, orange-brown, and brown SILTY SAND (SM), becoming
8	10			clayey at 12 ft bgs.
7	11			(Collect sample for environmental analysis from 10-15.5 ft bgs).
6	12			
5	13			Brown SILTY SAND (SM) and CLAYEY SILTY SAND (SC), wet at 13 ft bgs.
4	14			
3	15			Brown CLAYEY SILTY SAND (SC), sands becoming more coarse at 17.5 ft bgs.
				- END OF BORING AT 15.5 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	30
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-61
Start Date:	14-Jul-98	**Driller:**	J. Corron
Completion Date:	14-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	18 ft above msl (est.)	**Depth to Groundwater While Drilling:**	9 ft bgs
Depth of Boring:	30 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
18	0			
17	1	0 - 2		Concrete and asphalt (FILL)
16	2			
15	3	2 - 4		
14	4			
13	5	4 - 6	6,13,20,24	Dark yellowish-brown SILTY SAND (SM), moist.
12	6			
11	7	6 - 8	12,13,15,18	
10	8			
9	9	8 - 10	4,8,8,10	Dark yellowish-brown, orange-brown, and brown SILTY SAND (SM), becoming clayey at 12 ft bgs.
8	10			
7	11	10 - 12	6,9,11,12	
6	12			
5	13	12 - 14	9,8,8,10	Brown SILTY SAND (SM) and CLAYEY SILTY SAND (SC), wet at 13 ft bgs.
4	14			
3	15	14 - 16	5,4,5,6	Brown CLAYEY SILTY SAND (SC), sands becoming more coarse at 17.5 ft bgs.
2	16			
1	17	16 - 18	4,4,5,7	
0	18			
-1	19	18 - 20	4,6,12,15	Yellowish-brown SAND (SM), fine to coarse grain.
-2	20			Reddish-yellow CLAYEY SAND (SC), grading to very pale brown SILTY SAND (SM).
-3	21	20 - 22	4,15,20, 25	Brown to pale brown SAND (SP), fine to coarse grain.
-4	22			
-5	23	22 - 24	6,11,12,15	Brown SAND (SP), fine to coarse grain, 2-inch thick seam of white sands at 23 ft bgs.
-6	24			
-7	25	24 - 26	4,13,16,18	Brown SILTY SAND (SM) interbedded with brown to very pale brown SAND (SP - SM), coarse, angular grains, coarsest grains thus far.
-8	26			
-9	27	26 - 28	NR	
-10	28			
-11	29	28 - 30	6,8,10,12	Brown SILTY SAND (SM).
-12	30			
-13	31	30 - 32	2,3,8,12	Red, white, and yellowish-brown CLAY (CL), mottled, stiff, tight, dry.

-14	32				
					- END OF BORING AT 30 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	31
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 (ATV)
Start Date:	13-Jul-98	**Driller:**	K. Huber
Completion Date:	13-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	13 ft above msl	**Depth to Groundwater While Drilling:**	5.5 ft bgs
Depth of Boring:	15.5 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description (Lithologic description based on examination of split-spoon soil samples obtained from corresponding well 32)
13 ± – 9	0 – 4			(0-6" Topsoil) Brown CLAYEY SANDY SILT with pieces of concrete (FILL). Brown CLAYEY SANDY SILT (FILL), grading toward sand and becoming moist with depth.
8	5			Strong brown SANDY SILT (ML), moist, wet at 5.5 ft bgs.
7 – 3	6 – 10			Brown SILTY SAND (SM), very fine grain. 2-inch thick seam of fine to medium grain sands with less silt at 7 ft bgs.
2 – 1	11 – 12			Red and gray SANDY SILTY CLAY (CL) interbedded with brown SILTY SAND (SM), 2-inch thick seam of brown sand and gravel at 11.8 ft bgs.
0 – -1	13 – 14			Brown CLAYEY SILTY SAND (SC), very fine to coarse grain sands, few gravel.
-2 – -3	15 – 16			Brown SAND and GRAVEL (SW), grading into alternating beds of light brown-gray CLAYEY SILTY SAND (SC) and orange-brown SANDY SILTY CLAY (CL) at 14.3 ft bgs. sands are very fine to medium grain.

- END OF BORING AT 15.5 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	32
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 (ATV)
Start Date:	13-Jul-98	**Driller:**	K. Huber
Completion Date:	13-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	13 ft above msl	**Depth to Groundwater Wile Drilling:**	5.5 ft bgs
Depth of Boring:	30.5 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
13	0			
12	1	0 - 2	3,10,14,17	(0-6" Topsoil) Brown CLAYEY SANDY SILT with pieces of concrete (FILL).
11	2			
10	3	2 - 4	10,13,10,7	Brown CLAYEY SANDY SILT (FILL). grading toward sand and becoming moist with depth.
9	4			
8	5	4 - 6	3,5,6,10	Strong brown SANDY SILT (ML), moist. wet at 5.5 ft bgs.
7	6			
6	7	6 - 8	5,7,9,10	Brown SILTY SAND (SM), very fine grain, 2-inch thick seam of fine to medium grain sands with less silt at 7 ft bgs.
5	8			
4	9	8 - 10	7,9,10,9	
3	10			
2	11	10 - 12	2,3,7,10	Red and gray SANDY SILTY CLAY (CL) interbedded with brown SILTY SAND (SM), 2-inch thick seam of brown sand and gravel at 11.8 ft bgs.
1	12			
0	13	12 - 14	5,6,6,5	Brown CLAYEY SILTY SAND (SC), very fine to coarse grain sands, few gravel.
-1	14			
-2	15	14 - 16	3,4,4,5	Brown SAND and GRAVEL (SW), grading into alternating beds of light brown-gray CLAYEY SILTY SAND (SC) and orange-brown SANDY SILTY CLAY (CL) at 14.3 ft bgs, sands are very fine to medium grain.
-3	16			
-4	17	16 - 18	5,4,4,7	
-5	18			
-6	19	18 - 20	11,12,8,10	Orange-brown SAND (SP), very fine to medium grain, well sorted, becoming a SANDY CLAY (CL) interbedded with brown CLAYEY SILTY SAND (SC) at 19 ft.
-7	20			
-8	21	20 - 22	11,10,13,20	Strong-brown SAND (SP), very fine to medium grain, well sorted, few fines, 1-inch thick band of red sands at 21.5 ft bgs, and 1-inch thick seam of red-brown clayey sand at 23.5 ft bgs.
-9	22			
-10	23	22 - 24	12,10,14,23	
-11	24			
-12	25	24 - 26	2,19,13,20	Brown SAND (SP), fine to medium grain.
-13	26			
-14	27	26 - 28	6,6,7,10	Red and brown CLAY and SAND (SC), grading to red and brown very fine to medium grain sands with appreciable fines, fines less prominent with depth.
-15	28			
-16	29	28 - 30	5,7,12,15	Red SAND (SP), coarse, with few gravel interbedded with brown to organge-brown, fine to medium grain sands.
-17	30			

- END OF BORING AT 30.5 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	MW-34
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Unitech Drilling Co., Inc.
		Type of Drill:	CME 750
Start Date:	6-May-99	**Driller:**	Chris Warren
Completion Date:	6-May-99	**Geologist:**	P. Boteck
Ground Elevation:		**Depth to Groundwater While Drilling:**	2.5 ft.
Depth of Boring:	20 bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	**Well Installed:**	X
		Abandoned:	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
	0			Top 6" dark brown SILT and SAND top soil, then 4" light
	1	0 - 2	1,1,1,2	brown f-m sand, some silt (Rec. =10")
	2			
	3	2 - 4	2,3,3,4	Light brown and pale grey f-m SAND, some silt. Wet at 2.5'
	4			(Rec. = 16")
	5	4 - 6	3,3,4,5	Pale grey m-f SAND, some silt, trace gravel (Rec. =16")
	6			
	7	6 - 8	6,7,8,9	SAND (m-c), some fine sand, few silt and f-m gravel (rec.=12")
	8			
	9	8 - 10	7,8,4,4,	Top 5" grey m-c SAND with few rounded medium gravels.
	10			Bottom 3" dark brown, organic-rich, stiff CLAY. (Rec.=8")
	11	10 - 12	2,3,3,4	Dark brown med. SAND with silt, few clay, and rounded gravel.
	12			Tight, top 3" has most of the clay. (Rec.=6")
	13	12 - 14	9,9,10,11	Dark Brown SAND w/ silt, some clay, tight. 1" to 2" lenses of dark
	14			brown, organic-rich clay w/ m. rounded gravel. (Rec.=18")
	15	14 - 16	3,4,4,7	Top 8" light grey m. SAND w/ mod. stiff clay and some silt. Then 4"
	16			m. SAND w/ some silt and clay. Then 4" dk. brown SILT w/ med snd
	17	16 - 18	6,9,9,5	Light grey m-c SAND and f-c GRAVEL, some silt. At 10", v.stiff
	18			white clay for 2" followed by 2" of pale white m-c sand w/silt (Rec. 14)
	19	18 - 20	4,3,3,6	Pale white m-f SAND, w/silt, some clay
	20			Bottom 6" red and white mottled CLAY.
				- END OF BORING AT 20 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	MW-33
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Unitech Drilling Co., Inc.
		Type of Drill:	CME 750
Start Date:	6-May-99	**Driller:**	Chris Warren
Completion Date:	6-May-99	**Geologist:**	P. Boteck
Ground Elevation:		**Depth to Groundwater While Drilling:**	2.5 ft.
Depth of Boring:	10 bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers	**Well Installed:**	X
	with continuous split spoon sampling	**Abandoned:**	

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
	0	0 - 2		Top 6" dark brown SILT and SAND top soil, then 4" light brown f-m sand, some silt (Rec. =10")
	1			
	2	2 - 4		Light brown and pale grey f-m SAND, some silt. Wet at 2.5' (Rec. = 16")
	3			
	4	4 - 6		Pale grey m-f SAND, some silt, trace gravel (Rec. =16")
	5			
	6	6 - 8		SAND (m-c), some fine sand, few silt and f-m gravel (rec.=12")
	7			
	8	8 - 10		Top 5" grey m-c SAND with few rounded medium gravels.
	9			Bottom 3" dark brown, organic-rich, stiff CLAY. (Rec.=8")
	10			- END OF BORING AT 10 FT BGS -
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	OW-1
Location:	Pedricktown, New Jersey	**Drilling Firm:**	B&F Environmental
		Type of Drill:	Mobil B-57
Start Date:	27-Jan-99	**Driller:**	B. Michaelis
Completion Date:	27-Jan-99	**Geologist:**	D. Scotti
Ground Elevation:	10 ft above msl	**Depth to Groundwater While Drilling:**	3 ft bgs
Depth of Boring:	26 ft bgs		
Drilling Methods:	3.25" ID Hollow Stem Augers with split spoon sampling	**Well Installed:**	
		Abandoned:	X

(4 in - diameter well to be installed at a future time)

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
10	0			
9	1			Dark brown CLAYEY SILT (ML), few sand and gravel, moist, (FILL). Some organic material at 2 - 4 ft bgs. Wet at 3 ft bgs.
8	2			
7	3			
6	4			
5	5	4 - 6	7,7,9,10	Dark brown SAND and SILT (SM) grading to a dark brown CLAYEY SAND (SC), abundant organic material, sulfur odor.
4	6			
3	7			
2	8			Gray SANDY CLAY (CL) grading to a gray SAND (SP), fine to med.
1	9			Light brown and gray SAND (SP), fine to medium grain.
0	10			
-1	11	10 - 12	4,6,11,18	
-2	12			
-3	13			Gray SAND and GRAVEL (SW), sand grains are coarse, subrounded, some white, pink, and yellow grains. Becoming a coarse SAND (SP) and then a fine to medium grain SAND (SP), with fines, clayey lens at 14 ft bgs. Few coarse grains at 14 to 16 ft bgs and a 1" thick clay seam at 15 ft bgs. Light brown, gray, white, and pink SAND (SP) at 16 - 18 ft bgs, fine to medium grain, some silts, few gravel.
-4	14			
-5	15			
-6	16			
-7	17	16 - 18	10,14,20,15	
-8	18			
-9	19			White SAND and GRAVEL (SW - GW), sand grains are coarse, 1" diameter gravels at 18 - 19 ft bgs, some fines. Some small pockets of clay at 20 - 22 ft bgs.
-10	20			
-11	21	20 - 22	12,11,12,15	
-12	22			
-13	23	22 - 24	8,10,19,28	White SAND (SP - SW), coarse, some fine to medium grains, a 1" thick clay lens at approximately 22.5 ft bgs.
-14	24			
-15	25	24 - 26	18,19,21,24	White to light gray SAND and GRAVEL (SW - GW), sand grains are coarse. Fining to white CLAYEY SAND (SC) at 26 ft bgs.
-16	26			
-17	27	26 - 28	8,8,11,12	GRAVEL (GW), coarse, at top of brown and gray CLAY (CL), stiff, mottled, changing to red and white mottled clay at 27 ft bgs, thick.
-18	28			
				- END OF BORING AT 26 FT BGS - (split-spoon sample to 28 ft bgs; drill only to 26 ft bgs)

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	**PW-1**
Location:	Pedricktown, New Jersey	**Drilling Firm:**	B&F Environmental
		Type of Drill:	Mobil B-57
Start Date:	27-Jan-99	**Driller:**	B. Michaelis
Completion Date:	27-Jan-99	**Geologist:**	D. Scotti
Ground Elevation:	10 ft above msl	**Depth to Groundwater While Drilling:**	3 ft bgs
Depth of Boring:	26 ft bgs		
Drilling Methods:	3.25" ID Hollow Stem Augers	**Well Installed:**	
	with continuous split spoon sampling	**Abandoned:**	X

(6 in - diameter well to be installed at a future time)

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
10 #	0			
9	1	0 - 2	8,6,4,4	Dark brown CLAYEY SILT (ML), few sand and gravel, moist,
8	2			plastic casing (FILL).
7	3	2 - 4	3,2,2,1	Some organic material, wood chips at 2 - 4 ft bgs. Wet at 3 ft bgs.
6	4			
5	5	4 - 6	1,1,1,3	Light brown SAND and SILT (SM) grading to a dark brown
4	6			CLAYEY SAND (SC), abundant organic material, sulfur odor.
3	7	6 - 8	4,4,8,11	
2	8			Gray SANDY CLAY (CL) grading to a gray SAND (SP), fine to med.
1	9	8 - 10	3,6,8,11	Light brown and gray SAND (SP), fine to medium grain.
0	10			
-1	11	10 - 12	10,10,12,16	
-2	12			
-3	13	12 - 14	3,9,15,16	Gray SAND and GRAVEL (SW), sand grains are coarse, subrounded,
-4	14			some white, pink, and yellow grains. Becoming a coarse SAND (SP)
-5	15	14 - 16	4,7,14,16	and then a fine to medium grain SAND (SP), with fines, clayey lens
-6	16			at 14 ft bgs. Few coarse grains at 14 to 16 ft bgs and a 1" thick clay
-7	17	16 - 18	12,11,17,28	seam at 15 ft bgs. Light brown, gray, white, and pink SAND (SP) at
-8	18			16 - 18 ft bgs, fine to medium grain, some silts, few gravel.
-9	19	18 - 20	7,9,10,9	White SAND and GRAVEL (SW - GW), sand grains are coarse, 1"
-10	20			diameter gravels at 18 - 19 ft bgs, some fines.
-11	21	20 - 22	5,3,6,10	White SAND and GRAVEL (SW - GW), sand grains are coarse
-12	22			5" thick white clay lens at approximately 20.2
-13	23	22 - 24	4,6,8,10	White SAND (SP - SW), coarse, some fine to medium grains, a 1"
-14	24			thick clay lens at approximately 22.5 ft bgs.
-15	25	24 - 26	10,12,17,19	White to light gray SAND and GRAVEL (SW - GW), sand grains are
-16	26			coarse. Fining to white CLAYEY SAND (SC) at 26 ft bgs.
-17	27	26 - 28	8,12,17,21	GRAVEL (GW), coarse, at top of brown and gray CLAY (CL), stiff,
-18	28			mottled, changing to red and white mottled clay at 27 ft bgs, thick.
		- END OF BORING AT 26 FT BGS - (split-spoon sample to 28 ft bgs; drill only to 26 ft bgs)		

LITHOLOGIC LOG

Site Name: NL Industries Inc. Superfund Site
Location: Pedricktown, New Jersey
Start Date: 21-Jul-98
Completion Date: 21-Jul-98
Ground Elevation: 8 ft above msl
Depth of Boring: 26 ft bgs
Drilling Methods: 4.25" ID Hollow Stem Augers with continuous split spoon sampling

Boring Number: LFE-1
Drilling Firm: Hardin-Huber, Inc.
Type of Drill: Mobil B-57 (ATV)
Driller: J. Corron
Geologist: J. Moore
Depth to Groundwater Wile Drilling: 6 ft bgs
Well Installed:
Abandoned: X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
8	0			
7	1	0 - 2	2,2,3,4	Dark brown organic matter grading toward SILT and SAND (SM), damp, some clay.
6	2			
5	3	2 - 4	4,4,4,5	Brown SILT and SAND (SM), fine to medium grain sands, some gravel, abundant organic material (marsh conditions).
4	4			
3	5	4 - 6	5,6,10,11	Brown SAND (SM), fine to coarse grain, some silt, damp.
2	6			
1	7	6 - 8	5,7,12,9	Brown SAND (SM), fine to coarse grain, some silt and gravel. Wet at 6 ft bgs.
0	8			
-1	9	8 - 10	3,12,13,13	Brown SAND (SM), fine to coarse grain, some silt and clay.
-2	10			
-3	11	10 - 12	11,17,16,16	Tan GRAVEL and SAND and CLAY (GC), fine to coarse grain sands, some silt. Fines are cohesive, wet.
-4	12			
-5	13	12 - 14	4,9,10,15	Grayish white SAND and GRAVEL and CLAY (GC), medium to coarse grain sands, some silt, contains dark micaceous minerals, less cohesive than above. Clay content increasing with depth.
-6	14			
-7	15	14 - 16	5,7,8,9	
-8	16			
-9	17	16 - 18	4,12,10,7	Gray SAND and CLAY (SC), fine grain sands, cohesive.
-10	18			
-11	19	18 - 20	4,5,7,7	Red and gray CLAY (CL), mottled, stiff.
-12	20			
-13	21	20 - 22	8,9,10,10	
-14	22			
-15	23	22 - 24	3,4,6,9	
-16	24			
-17	25	24 - 26	2,4,6,8	Red and gray CLAY (CL), mottled, stiff, with some silt and trace fine sand grains.
-18	26			

- END OF BORING AT 26 FT BGS -

LITHOLOGIC LOG

Site Name: NL Industries Inc. Superfund Site
Location: Pedricktown, New Jersey

Start Date: 21-Jul-98
Completion Date: 21-Jul-98

Ground Elevation: 8 ft above msl
Depth of Boring: 26 ft bgs

Drilling Methods: 4.25" ID Hollow Stem Augers with continuous split spoon sampling

Boring Number: LFE-2
Drilling Firm: Hardin-Huber, Inc.
Type of Drill: Mobil B-57 (ATV)
Driller: J. Corron
Geologist: J. Moore

Depth to Groundwater Wile Drilling: 6 ft bgs

Well Installed:
Abandoned: X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
8 to 6	0 to 2	0 - 2	4,5,5,4	Brown SAND and SILT (SM), fine grain sands, some organic matter.
6 to 4	2 to 4	2 - 4	3,5,8,10	Brown SAND and SILT (SM), fine grain sands, some gravel and organic matter.
4 to 2	4 to 6	4 - 6	16,24,25,20	Brown SAND and SILT (SM), fine grain sands, some gravel and clay.
2 to 0	6 to 8	6 - 8	6,8,14,7	Gray to brown SAND (SW - SC), fine to coarse grain, some gravel and clay. Wet at 6 ft bgs.
0 to -2	8 to 10	8 - 10	6,8,17,25	
-2 to -4	10 to 12	10 - 12	9,9,14,12	Gray GRAVEL and SAND and CLAY (GC), cohesive.
-4 to -6	12 to 14	12 - 14	5,11,5,9	Tan and gray SAND and SILT (SW - SC), some gravel and clay, less cohesive than above.
-6 to -8	14 to 16	14 - 16	3,5,7,6	Tan SAND and GRAVEL (SW), fine to coarse grain sands, some silt.
-8 to -10	16 to 18	16 - 18	4,7,10,10	Gray SAND and GRAVEL (SW), medium to coarse grain sands, some silt and clay, cohesive.
-10 to -12	18 to 20	18 - 20	4,4,4,5	
-12 to -14	20 to 22	20 - 22	6,7,10,11	
-14 to -16	22 to 24	22 - 24	5,4,10,14	Gray CLAY (CL), stiff, some silt, sand, and gravel.
-16 to -18	24 to 26	24 - 26	4,4,7,7	Red and gray CLAY (CL), mottled, stiff, with some silt and trace fine sand grains.

- END OF BORING AT 26 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	**LFE-3**
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 (ATV)
Start Date:	21-Jul-98	**Driller:**	J. Corron
Completion Date:	21-Jul-98	**Geologist:**	J. Moore
Ground Elevation:	8 ft above msl	**Depth to Groundwater Wile Drilling:**	5.5 ft bgs
Depth of Boring:	26 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	**Well Installed:**	
		Abandoned:	X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
8	0			
7	1	0 - 2	3,4,10,10	Brown SAND and SILT (SM), fine grain sands, some organic matter, dry.
6	2			
5	3	2 - 4	6,6,8,10	Brown SAND (SM), fine to medium grain sands, some gravel and silt, dry.
4	4			
3	5	4 - 6	2,5,6,7	Tan SAND (SW), fine to coarse grain, some gravel, very moist. Wet at 5.5 ft bgs.
2	6			
1	7	6 - 8	3,5,7,7	
0	8			
-1	9	8 - 10	4,8,10,11	Gray GRAVEL, SAND, SILT, and CLAY (GC), slightly cohesive.
-2	10			
-3	11	10 - 12	2,3,8,9	Gray SAND (SW - SM), fine to coarse grain, some gravel and silt, contains dark
-4	12			micaceous minerals, few clay, less cohesive than above.
-5	13	12 - 14	3,7,8,8	Tan and gray SAND and GRAVEL (SW - SC), some silt and clay, less cohesive
-6	14			than above.
-7	15	14 - 16	2,2,3,2	
-8	16			
-9	17	16 - 18	3,5,5,7	Tan and gray SAND and GRAVEL (SW - SC), some silt and clay, grading toward a clay.
-10	18			Gray and red SILTY CLAY (CL).
-11	19	18 - 20	5,5,7,13	Gray SAND and CLAY (SC), fine to coarse grain sands, some gravel.
-12	20			
-13	21	20 - 22	3,7,10,13	Gray SAND (SP), fine to coarse grain.
-14	22			
-15	23	22 - 24	6,7,22,30	
-16	24			
-17	25	24 - 26	10,11,19,30	
-18	26			
				- END OF BORING AT 26 FT BGS -

LITHOLOGIC LOG

Site Name: NL Industries Inc. Superfund Site
Location: Pedricktown, New Jersey
Start Date: 22-Jul-98
Completion Date: 22-Jul-98
Ground Elevation: 8 ft above msl
Depth of Boring: 52 ft bgs
Drilling Methods: 4.25" ID Hollow Stem Augers with continuous split spoon sampling

Boring Number: LFE-4
Drilling Firm: Hardin-Huber, Inc.
Type of Drill: Mobil B-57 (ATV)
Driller: J. Corron
Geologist: P. Botek
Depth to Groundwater Wile Drilling: 6 ft bgs
Well Installed:
Abandoned: X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
8 #	0			
7	1	0 - 2	2,3,7,7	Light brown to gray SILTY SAND (SM).
6	2			
5	3	2 - 4	3,4,5,9	Brown SILTY SAND (SM), with few rounded gravel.
4	4			
3	5	4 - 6	5,7,6,4	Light brown SILTY SAND (SM). Wet at 6 ft bgs.
2	6			
1	7	6 - 8	5,7,10,13	Pale gray CLAYEY SILT (ML). very tight.
0	8			Pale gray to white to brown SILTY SAND (SM).
-1		8 - 10	3,5,10,11	
	9			
-2	10			Light brown and gray SANDY CLAY (CL), mottled, very tight, grading to clayey sand.
-3	11	10 - 12	5,9,11,9	Pale gray to light brown CLAYEY SAND (SC), very tight.
-4	12			
-5	13			
-6	14	12 - 14	3,5,9,9	Pale gray CLAYEY SILT (ML), very tight, with some iron oxide staining.
-7	15	14 - 16	4,5,5,6	Pale gray SILTY SAND (SM)
	16			Pale gray and light brown CLAY (CL), mottled, stiff.
-9	17	16 - 18	5,6,5,5	Pale gray CLAYEY SAND (SC), medium to coarse grain sands, grading to gray and
-10	18			yellowish-brown SAND (SM - SC) and gray SILTY CLAY (CL), stiff at end of spoon.
-11	19	18 - 20	4,9,11,11	Gray CLAYEY SILT (ML).
-12	20			Pale gray SILTY SAND (SM).
-13	21	20 - 22	1,1,2,2	Pale white SILTY SAND (SM), fine to medium grain, loose.
-14	22			
-15	23			
-16	24			
-17	25			
-18	26	25 - 27	7,7,10,11	Light-gray to pale white SILTY SAND (SM), fine to medium grain, contains dark
-19	27			micaceous minerals.
-20	28	27 - 29	4,4,6,9	Pale white SAND (SP), coarse, angular grain, loose with some gravel and silt.

LITHOLOGIC LOG

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
-21	29			Pale white SAND (SP). coarse, angular grain, loose with some gravel and silt.
-22	30	29 - 31	4,4,4,4	Pale gray SILTY SAND (SM), fine to coarse grain, some pink grains, loose.
-23	31			
-24	32			
-25	33	32 - 34	7,10,17,20	Red and tan and pale white CLAY (CL), mottled, stiff, moist.
-26	34			
-27	35	34 - 36	Shelby Tube	
-28	36			
-29	37	36 - 38	Shelby Tube	Pale gray SILTY SAND (SM), with some clay.
-30	38			
-31	39	38 - 40	Shelby Tube	
-32	40			
-33	41	40 - 42	15,20,36,40	Red and brown CLAY (CL), mottled, stiff (2" thick seam) grading to light gray and pale white SILTY SAND (SM), contains dark striations - micaceous minerals.
-34	42			
-35	43			
-36	44			
-37	45			
-38	46			
-39	47			
-40	48	47 - 49	11,21,21,30	Red CLAY(CL), stiff, moist and pale gray SILTY SAND (SM), tight.
-41	49			
-42	50			
-43	51	50 - 52	4,10,15,16	
-44	52			
				- END OF BORING AT 52 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	**Boring Number:**	SBE
Location:	Pedricktown, New Jersey	**Drilling Firm:**	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 (ATV)
Start Date:	9-Jul-98	**Driller:**	K. Huber
Completion Date:	9-Jul-98	**Geologist:**	D. Scotti
Ground Elevation:	20 ft above msl	**Depth to Groundwater Wile Drilling:**	14 ft bgs
Depth of Boring:	15 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	**Well Installed:**	
		Abandoned:	X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
20	0			
19	1	0 - 2	2,4,9,11	(0-6" Topsoil with some Gravel) Dark yellowish brown SILT Loam (FILL) becoming more coarse and moist with depth, some gravel at 4 - 6 ft bgs (max. 1" diameter).
18	2			
17	3	2 - 4	6,7,7,9	
16	4			
15	5	4 - 6	4,6,9,15	
14	6			
13	7	6 - 8	4,8,11,14	Light olive brown to yellowish brown SAND (SP), medium grain, with some gravel (max. 1" diameter) (FILL). Black staining at 9.6 ft bgs.
12	8			
11	9	8 - 10	5,17,24,35	
10	10			
9	11	10 - 12	4,5,1,5,	Brown SAND (SP), very fine grain, well sorted loose, moist. Collect sample for environmental analysis.
8	12			
7	13	12 - 14	7,5,4,7	Wet at 14 ft bgs. Collect sample for environmental analysis.
6	14			
5	15			Gray SILTY SAND (SM), very fine to medium grain sands.

- END OF BORING AT 15 FT BGS -

LITHOLOGIC LOG

Site Name:	NL Industries Inc. Superfund Site	Boring Number:	SBW
Location:	Pedricktown, New Jersey	Drilling Firm:	Hardin-Huber, Inc.
		Type of Drill:	Mobil B-57 (ATV)
Start Date:	9-Jul-98	Driller:	K. Huber
Completion Date:	9-Jul-98	Geologist:	D. Scotti
Ground Elevation:	20 ft above msl	Depth to Groundwater Wile Drilling:	14 ft bgs
Depth of Boring:	15 ft bgs		
Drilling Methods:	4.25" ID Hollow Stem Augers with continuous split spoon sampling	Well Installed:	
		Abandoned:	X

Elevation (ft above msl)	Depth (ft bgs)	SPT Interval	SPT (Blows/6")	Lithologic Description
20	0			
19	1	0 - 2	1,2,5,7	(0-6" Topsoil with some Gravel) Dark yellowish brown SILT Loam (FILL) becoming more coarse and moist with depth.
18	2			
17	3	2 - 4	7,8,4,6	
16	4			
15	5	4 - 6	4,4,4,8	
14	6			
13	7	6 - 8	7,10,13,16	Brownish yellow SAND (SP), fine to medium grain, well sorted, moist, few silt, (FILL).
12	8			
11	9	8 - 10	7,14,15,19	Brownish yellow SAND and GRAVEL (SP), fine to med. grain sands, gravel 2" dia. (max.), moist, few silt (FILL). Black staining on grains at 9.5 ft bgs.
10	10			
9	11	10 - 12	19,16,15,12	Dark yellowish brown SAND (SP), very fine to fine grain, well sorted loose, moist. Collect sample for environmental analysis. [PID = 5.3]
8	12			
7	13	12 - 14	11,11,11,11	Brown to dark gray SAND (SP), very fine to fine grain, well sorted, moist, wet at 14 ft bgs. Dark staining on grains at 12 to 13.8 ft bgs. Collect sample for environmental analysis. [PID = 7.1]
6	14			
5	15			

- END OF BORING AT 15 FT BGS -

APPENDIX B

LANDFILL SITING EVALUATION GEOTECHNICAL ANALYSES

GeoSyntec Consultants

Geomechanics and Environmental Laboratory

Sample ID: LFE-4 34-36'
Project Name: N.L. Industries
Project No.: ME0015

rious Test Standards

SOIL INDEX PROPERTIES

Figure

AS-RECEIVED MOISTURE CONTENT

ASTM D 2216 ☒
ASTM D 4643 ☐
Moisture Content (%): 16.7

DRY UNIT WEIGHT OF UNDISTURBED SAMPLE

ASTM D 2937
Dry Unit Weigh (γ_d, pcf):

SPECIFIC GRAVITY

ASTM D 854 ☒
ASTM C 127 ☐
Specific Gravity (-): 2.66

SOIL pH

ASTM D 4972 ☐
EPA MET. 9045 ☐
pH: (with distilled-deionized water)
pH: (with 0.01 M $CaCl_2$ solution)

SOIL ORGANIC CONTENT

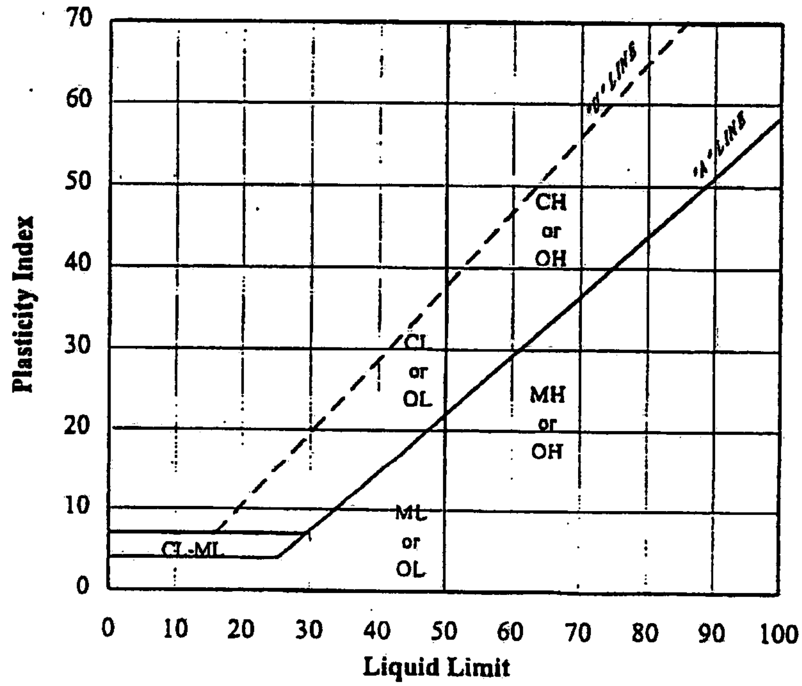
ASTM D 2974
Organic Content (%):

CARBONATE CONTENT

ASTM D 4373 ☐
ASTM D 3042 ☐ (see figures)
Carbonate Content (%):

ATTERBERG LIMITS

ASTM D 4318
Liquid Limit (LL, %):
Plastic Limit (PL, %):
Plasticity Index (PI):



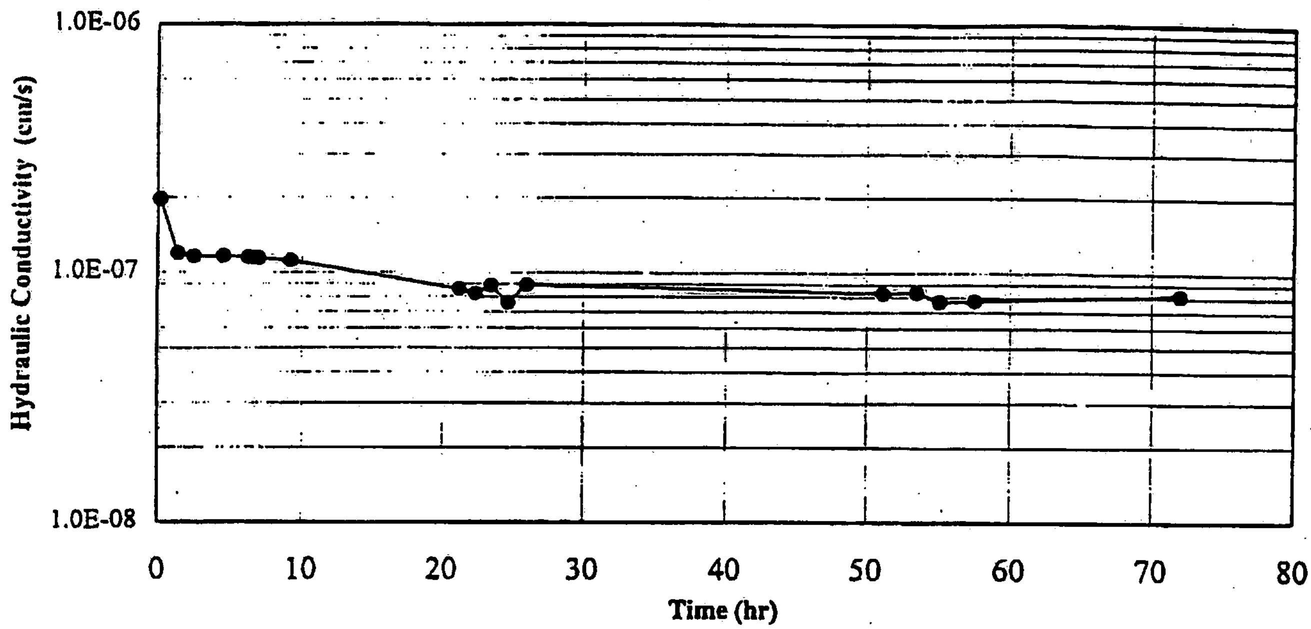
Sample ID	Lab Sample Number	Moisture Content (%)	Dry Unit Weight (pcf)	Specific Gravity (-)	Soil pH (water) (-)	Soil pH ($CaCl_2$) (-)	Organic Content (%)	Carbonate Content (%)	Atterberg Limits LL (%)	Atterberg Limits PL (%)	Atterberg Limits PI (-)
LFE-4 34-36'	98164	16.7		2.66							

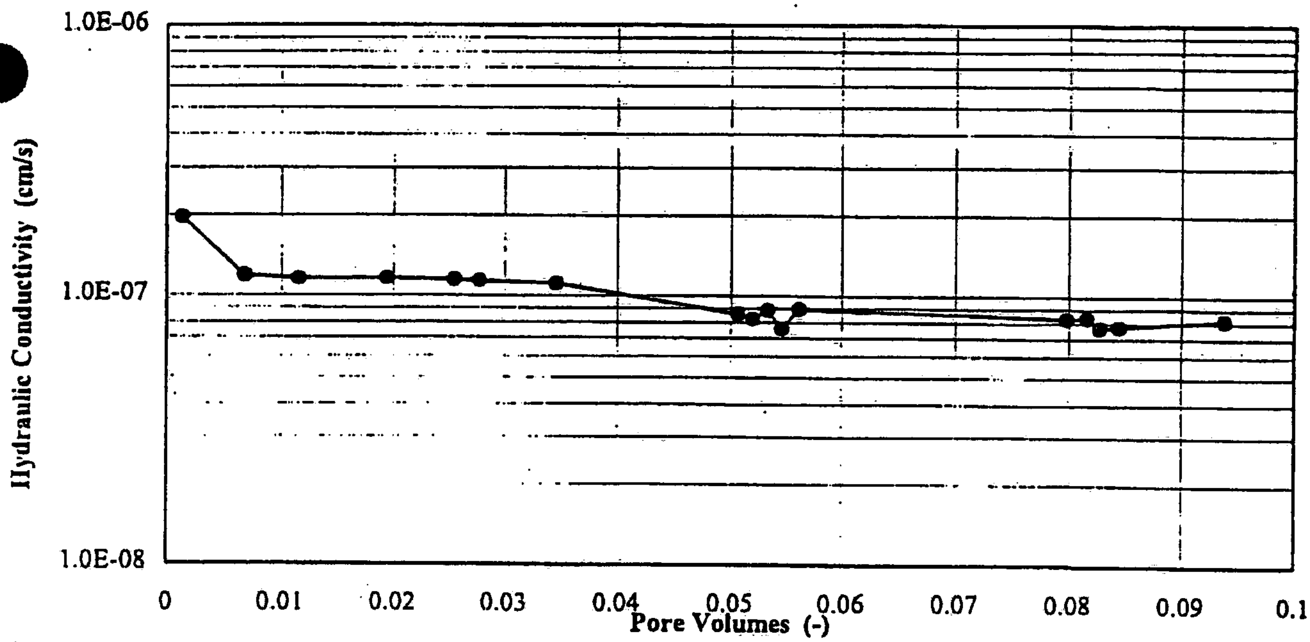
-(s):

GeoSynt... Consultants
Geomechanics and Environmental Laboratory

Sample ID: LFE-4 34-36'
Project Name: N.L. Industries
Project No.: ME0015

ASTM D 5084 | HYDRAULIC CONDUCTIVITY TESTING | Figure





Sample ID	Lab Sample No.	Specimen Initial Condition		Consolidation Pressure, σ_c (psi)	Hydraulic Conductivity, k (cm/s)
		Dry Unit Weight (pcf)	Moisture Content (%)		
LFE-4 34-36'	98164.1	111.7	16.6	17.4	8.0E-8

e(s):

GEOSYNTEC CONSULTANTS

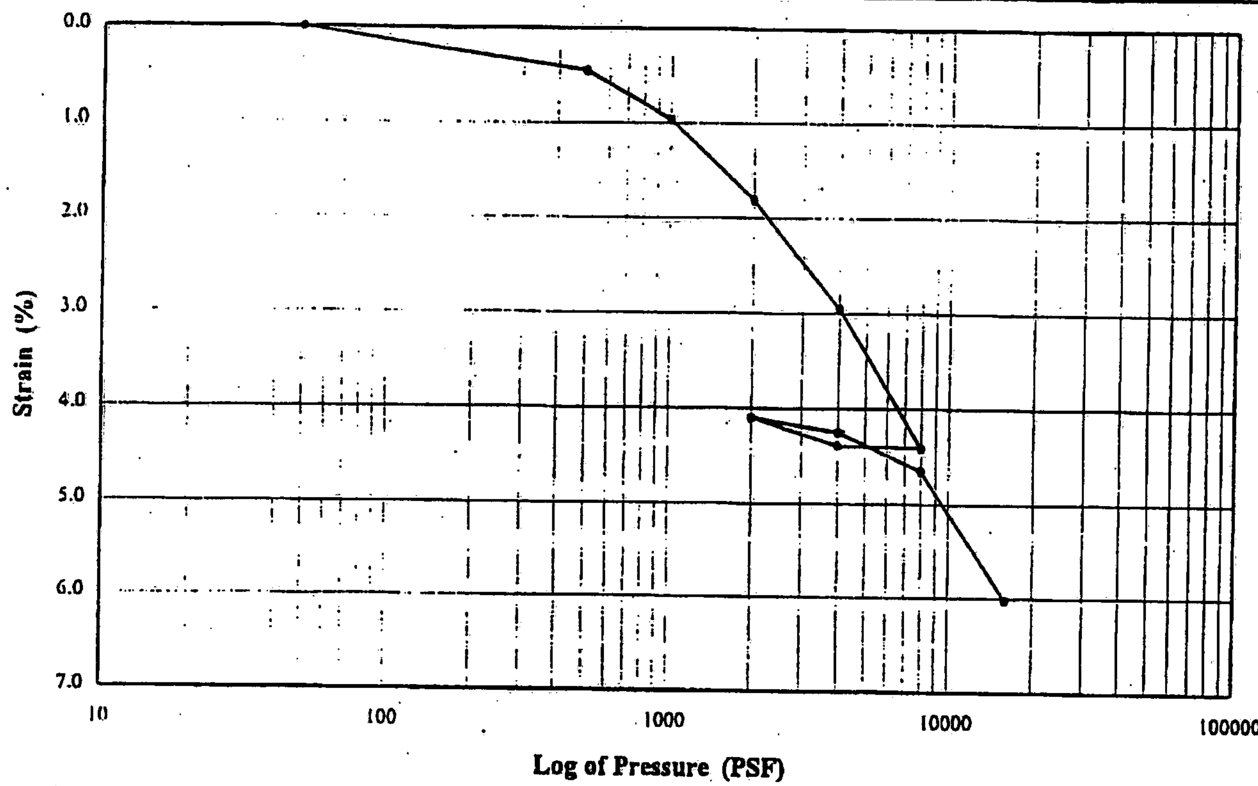
Geomechanics and Environmental Laboratory

Sample ID: LFE-4 34-36'
Project Name: N. L. Industries
Project No: ME0015

Test Standard: ASTM D 2435

ONE-DIMENSIONAL CONSOLIDATION TEST

File Name: 45986800.XLS



Client Sample ID	Lab Sample No.	Specimen No.	Test Specimen Initial Conditions: Dry Unit Weight (pcf)	Test Specimen Initial Conditions: Moisture Content (%)	Consolidation Pressure (psf)	Vertical Strain (%)			Remarks
LFE-4 34-36'	98164.2	1	109.6	17.6	500	0.45			
					1000	0.96			
					2000	1.81			
					4000	2.95			
					8000	4.41			
					4000	4.39			Rebound
					2000	4.09			Rebound
					4000	4.25			Reload
					8000	4.65			Reload
					16000	6.02			

Note(s):

NA-YTICAL SERV-ICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS, GA 30092
(770) 734-4200 • FAX (770) 734-4201

LABORATORY REPORT

ants
.ge Road

022

arry Sigmon

October 1, 1998

Report No. 99409

Sample Description

ries, ME0015, Sample 98I63(LFE-4 32-34'), received

RESULTS

	Result	Detection Limit
:ity (Na Acetate)(meq/g)	61	0.41

Respectfully submitted,

Project Manager

Quality Assurance

A Unit of American Analytical Services, Inc.

Analytical Services Inc. Batch QC
For Report Number :99409

h General Information

ıtch ıber	Analyte	Analysis Method	Matrix		Blank Result	Prep. Method
:6	CEC	EPA 9081	Solid	<	0.4100	

`Note : QC PASSES ON LCS,LCSD

Control Information

ıtch ıber	Analyte	Method	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
:6	CEC	EPA 9081	104	102	2	76 - 124	0 - 20

ix Spike Information

ıtch ıber	Analyte	Method	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
6	CEC	EPA 9081	225	196	14	76 - 124	0 - 20

Q.C. Information for Batch # 42026 For Report Number :99409

Sample Batch Information
Analysis : CEC

ple ID	Tag	Preparation Date	Time	By	Preparation Notes	Analysis Date	Time	By	Inst
26BLANK	Na	09/28/98	0800	RCP	36	09/29/98	0948	MCW	ICP1
26LCS	Na	09/28/98	0800	RCP	36	09/29/98	0952	MCW	ICP1
26LCSD	Na	09/28/98	0800	RCP	36	09/29/98	0955	MCW	ICP1
)9MS	Na	09/28/98	0800	RCP	36	09/29/98	0959	MCW	ICP1
)9MSD	Na	09/28/98	0800	RCP	36	09/29/98	1002	MCW	ICP1
)9	Na	09/28/98	0800	RCP	36	09/29/98	1006	MCW	ICP1

APPENDIX C

CORE LABORATORIES REPORT

CORE LAB

CORE LABORATORIES

PETROGRAPHIC ANALYSES

FOR

GEOSYNTEC CONSULTANTS
SOIL SAMPLES
NL INDUSTRIES PROJECT

File 198178
October 1998

Performed by:
Core Laboratories, Advanced Technology Center
Reservoir Geology/Stratigraphy Group
1875 Monetary Lane
Carrollton, Texas 75006
U.S.A.
(972) 466-2673

PROJECT TEAM

Drew L. Dickert
Senior Petrologist

Malcolm S. Jones
X-ray Diffraction Specialist

Mark A. Smesny
Thin Section Preparation

Donald G. Harville
Supervisor/Reviewer

TABLE OF CONTENTS

DISCUSSION

Introduction

Core Laboratories' Reservoir Geology/Stratigraphy Group, Carrollton, Texas, performed a petrographic study on four soil samples from NL Industries, Pedricktown, New Jersey. The analyses performed were detailed thin section petrography (includes a point-count of 250 points) and bulk & clay X-ray diffraction (XRD). The purposes of this study are to describe the natural soil texture and composition, document the presence or absence of any mineral matrices in the samples that may contain lead-bearing substances, and identify any lead-bearing substances, if possible. Table 1 shows the XRD data, and Table 2 contains the point-count results. Plates 1 through 4 display the thin section photomicrographs and descriptions. The following discussion summarizes the findings. For ease of reference in the discussion, the sample names have been shortened to SV26, SV28, SV29, and SV40.

Sample Descriptions

The thin section analysis shows that all four soil samples are poorly sorted sands. SV26, SV28, and SV40 are silty sands, in which at least ten percent of the grains are silt sized. SV29 is a muddy sand, where clay matrix and silt together compose over ten percent of the sample. The muddy sand has the finest estimated average grain size (0.28 mm, excluding clay matrix), whereas the other sands have estimated average grain sizes between 0.36 and 0.40 millimeters. Most of the grains in each sample range from <0.01 to 2.5 millimeters in diameter. No pebbles (grains >4 mm) are present in the thin sections; however, traces of pebbles were noted in the jars containing SV26 and SV28, and minor amounts of pebbles in the SV40 sample jar. The individual grain shapes in each sample range from rounded to angular. Subrounded and subangular grains are predominant. Angular grains are mostly concentrated in the finer grain size fractions. Samples SV29 and SV40 seem to contain greater amounts of rounded grains than the other two samples. Grain compaction and natural pore systems could not be assessed, because these sands are unconsolidated and disaggregated in the thin sections. The uneven distribution of silt, clays, and heavy minerals in SV26, SV28, and SV40 could be wholly the result of sample preparation, or it may indicate the presence of some disrupted lamination.

The soil composition was measured two different ways. XRD analysis (Table 1) shows that three of the samples (SV 26, SV28, and SV40) contain 96 to 99 percent quartz, with small amounts of feldspars and clays. Sample SV29 contains only 83 percent quartz by XRD, with 11 percent clays and 5 percent feldspars. Point-count analysis (Table 2) shows similar proportions of quartz, feldspars, and clays, compared to Table 1. Most of the quartz occurs as individual mono- and poly-crystalline grains. The minor metamorphic rock fragments (0.4 – 2.4%) are mostly metaquartzites. Traces of quartz overgrowth cement are found on some grains (Plate 1B). Some of these overgrowths probably formed in-situ, but others may be relics from a recycled sandstone source. Small amounts of heavy minerals (magnetite/ilmenite, tourmaline, zircon, hornblende, etc.) and glauconite grains are also found in every sample. The muddy sand (SV29, Plate 3) contains common clay matrix. Samples SV28 and SV40 contain minor amounts of clay matrix, 2 percent and 3 percent by XRD, respectively. The thin sections also reveal a little more clay in SV40 than SV28, although this is not reflected in the point-count results because of the highly uneven distribution of clays in SV40. The clay minerals are mostly detrital, but they appear to be partially altered and recrystallized. XRD results reveal that the clay fractions consist of 60 to 78 percent kaolinite and 22 to 40 percent illite/mica (includes sericite). Tiny crystals and coatings of iron oxide and titanium oxide represent 1.2 to 4.0 percent of the thin sections by point-count. Traces of organic grain coatings are present in one sample (SV29). Rare amounts of dolomite occur within a few quartz grains (SV26 and SV28). XRD detected possible traces of lead phosphate in SV28 and SV40.

Conclusions

The main purpose of this study was to document the presence or absence of any mineral matrices that may contain lead compounds that could be interpreted to be contaminants from the seeping of lead-bearing fluids into the soil. As a secondary purpose, any lead-bearing substances detected were to be identified.

Some of the quartz and feldspar grains show signs of leaching (pitted grains; Plates 1A & 4A), but this can be present in natural soils and does not necessarily indicate damage from contaminating fluids. The thin sections reveal no mineral grains or crusts that are composed principally of lead compounds. Using polarized and reflected light microscopy, the minor amounts of dark coatings on grains and tiny crystals in the clay matrix (Plates 1-4B) are identified as mostly iron and titanium oxides. Many of these crystals are so small (<1-3 microns) that they cannot be adequately identified in thin section. If any lead compounds or elemental lead are present, they should be associated with these tiny crystals and the oxide coatings. Clay aggregates of kaolinite and illite/mica may be able to adsorb lead onto the clay crystal surfaces; however, these clay types are not noted for absorption of elements into their crystal structures.

The traces of lead phosphate reported by XRD in SV28 and SV40 are based on one peak in the diffraction pattern matching the primary peak for lead phosphate. In XRD analysis, separate mineral phases are recognized by distinct diffraction patterns containing a primary peak and secondary peaks for each mineral. The secondary peaks of some minerals can overlap primary peaks of other minerals. Also, relative peak heights are related to mineral concentration, and the secondary peaks for minerals present in small quantities are not generally detectable. Even the primary peaks for trace minerals are sometimes difficult to resolve from background noise. The peak identified to be a primary peak for lead phosphate does not seem to correspond to a secondary peak of any other component in the sample (if it did, the interpretation of lead phosphate would not be justified). Thus, the presence of small amounts of lead phosphate is a possibility, even though a distinct diffraction pattern for this compound is lacking (no secondary peaks). If lead phosphate is indeed present, one would expect it to be most prevalent in SV29, where clay matrix and iron and titanium oxide coatings are most common, but XRD does not show traces of lead phosphate for this sample.

This thin section and XRD study shows that mineral matrices that may contain lead-bearing substances are present. However, lead compounds, if present, are rare in these soil samples. These analyses are not sufficiently sensitive to completely affirm or deny the presence of rare amounts of lead in these samples.

ANALYTICAL PROCEDURES

Thin Section Preparation

Sample fractions are prepared for thin section analysis by first impregnating them with epoxy to augment sample cohesion and to prevent loss of materials during grinding. A blue dye was added to the epoxy to highlight the pore spaces. Each sample was mounted on a frosted glass slide and then cut and ground in water to an approximate thickness of 30 microns. The thin sections were examined using standard petrographic techniques.

X-ray Diffraction Analysis

X-ray diffraction analysis provides the identification and quantification of the rock-forming minerals present in the formation. Samples selected for bulk and clay X-ray diffraction analysis were dried and cleaned of obvious contaminants. Each sample was dried, weighed, placed in water and treated with a sonic cell disrupter. The resultant slurries were centrifuged to fractionate each fraction at 4 microns. The suspended <4 micron fraction was decanted and saved. The >4 micron fraction was dried and weighed to determine the percent of clay- and silt-sized materials. The suspended <4 micron fraction was suctioned onto a pure silver substrate to orient the clay-sized particles. The <4 micron fraction was analyzed in an air-dried state and then treated with ethylene glycol vapor for 24 hours and re-analyzed. The >4 micron fraction was milled and scanned on an X-ray diffractometer. The samples selected for bulk analysis only were also milled and scanned on the diffractometer. The resulting diffractograms were then analyzed for mineral content using a profile-fitting algorithm. The integrated areas from the profile-fitting algorithm were entered into a spreadsheet that contains correction coefficients for numerous minerals. These coefficients were obtained according to the adiabatic method outlined by Chung (1974a, 1974b, 1974c). The tabular data are reported in a weight percent format in Table 1.

REFERENCES

Chung, F.H. (1974) A new X-ray diffraction method for quantitative multicomponent analysis. Advances in X-ray Analysis, 17, 106-115.

Chung, F.H. (1974) Quantitative interpretation of X-ray diffraction patterns of mixtures. I. Matrix-flushing method for quantitative multicomponent analysis. Journal of Applied Crystallography, 7, 519-525.

Chung, F.H. (1974) Quantitative interpretation of X-ray diffraction patterns of mixtures. II. Adiabatic principle of X-ray diffraction analysis of mixtures. Journal of Applied Crystallography, 7, 526-531.

Folk, R.L. (1980) Petrology of Sedimentary Rocks. Hemphill Publishing Company, Austin, Texas, 184p.

Geosyntec Consultants
NL Industries Project

Table 1
Mineral Analysis by X-ray Diffraction

File: 198178

	Whole Rock Composition (weight %)											Relative Clay Abundance (Normalized to 100%)				
Sample ID	Depth	Quartz	K feldspar	Plagioclase	Calcite	Dolomite	Siderite	Pyrite	Pb phosphate	Hematite	*Total Clays*	Illite/Mica	Kaolinite	Chlorite	Smectite	Illite/ Smectite
SV26 7/20/98	14-16	99	0	Tr	0	Tr	0	0	0	0	*1*	31	69	0	0	0
SV28 7/16/98	12-16	96	1	1	0	Tr	0	0	Tr	0	*2*	40	60	0	0	0
SV29 7/15/98	10-16	83	3	2	0	1	0	0	0	Tr	*11*	22	78	0	0	0
SV-40	N/A	96	0	Tr	0	1	0	0	Tr	0	*3*	36	64	0	0	0

GeoSyntec Consultants
Sand Soil Samples
NL Industries Project

C.L. File No: 198178
Date: 27-Oct-98
Petrologist: D. Dickert

Table 2
Modal Percent

Sample ID		SV26	SV28	SV29	SV40
Quartz:	Monocrystalline	74.0	80.8	61.6	76.0
	Polycrystalline	17.6	10.8	7.2	17.2
	Total	91.6	91.6	68.8	93.2
Feldspars:	K-Feldspar	0.4	0.8	2.4	1.2
	Plagioclase	tr	tr	1.6	tr
	Total	0.4	0.8	4.0	1.2
Rock Fragments:	Crystalline Igneous		tr	0.8	tr
	Sedimentary	0.4	tr	4.0	0.4
	Metamorphic	1.2	0.8	2.4	0.4
	Chert/Chalcedony	tr	1.2	0.4	0.4
	Total	1.6	2.0	7.6	1.2
Accessory:	Biotite	tr		tr	tr
	Muscovite	tr	tr	1.6	tr
	Magnetite/Ilmenite	1.2	tr	0.4	0.4
	Tourmaline	0.4	tr	0.4	tr
	Zircon	tr	0.4	tr	tr
	Hornblende	tr	tr	0.4	tr
	Sphene	0.4		tr	
	Other Heavy Minerals	tr	tr	0.4	tr
	Glauconite	0.8	tr	0.4	tr
	Organic Debris	tr			
	Total	2.8	0.4	3.6	0.4
Matrix:	Detrital Clay	0.4	2.8	10.8	2.4
	Pseudomatrix				
	Total	0.4	2.8	10.8	2.4
Clays: (Authigenic)	Kaolinite	tr	tr		tr
	Chlorite		tr	tr	tr
	Sericite	tr	tr	tr	tr
	Undiff. Illite/Smectite	0.8	0.4	tr	0.4
	Total	0.8	0.4		0.4
Non-Clay Cements:	Quartz Overgrowths	0.8	0.4	0.8	tr
	Feldspar Overgrowths				
	Dolomite	tr	tr		
	Pyrite				
	Iron Oxide	0.8	0.4	2.4	tr
	Titanium Oxide	0.8	1.2	1.6	1.2
	Organic Coatings			0.4	
	Total	2.4	2.0	5.2	1.2
Porosity:	Not counted - disaggregated samples				
	Total				
Grand Total		100.0	100.0	100.0	100.0

THIN SECTION PETROGRAPHY

GeoSyntec Consultants
Soil Samples
NL Industries Project
Sample: SV26072098
Depth: 14 - 16 feet

Plate 1A

0 mm 1
31X

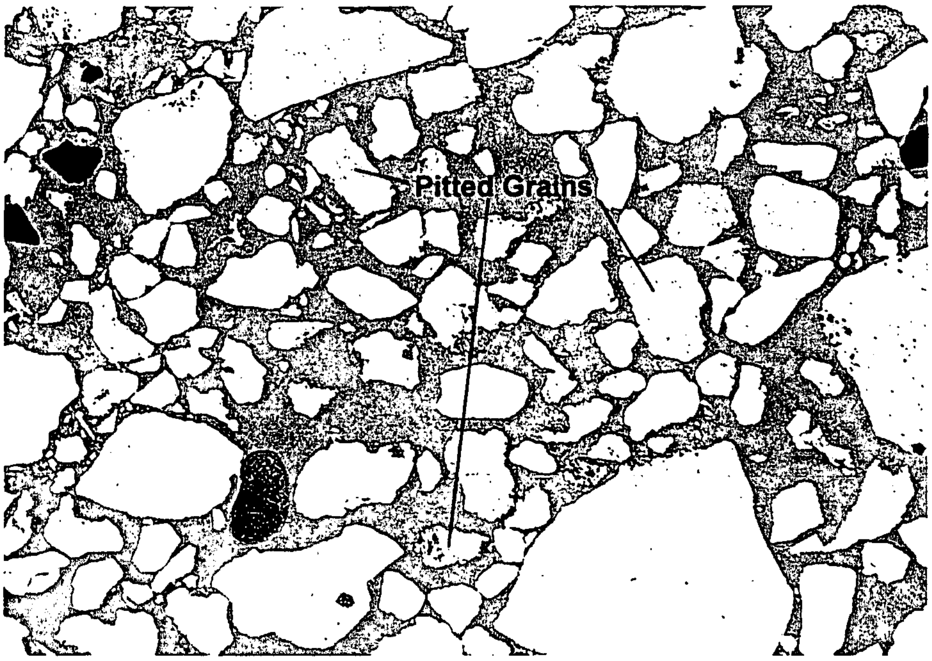
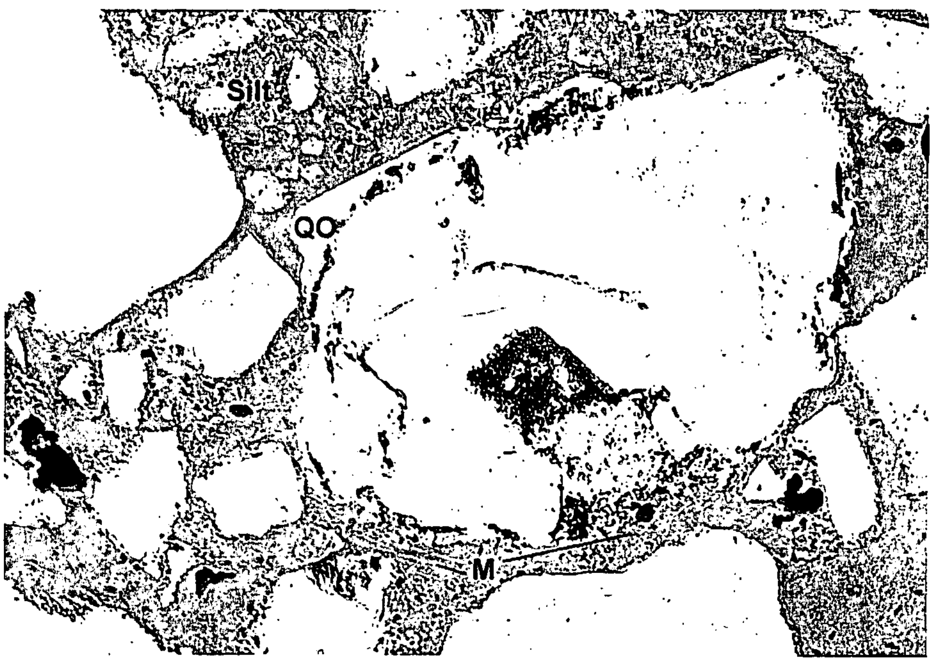


Plate 1B

0 mm 0.25
200X



Soil Type & Texture	
Classification (Folk)	Silty sand
Grain Size (mm)	Range = <0.01 - 2.54
(estimated)	Avg. = 0.40 (med. sand)
Grain Sorting	Poor
Grain Roundness	Rounded to angular
Compaction	Disaggregated
Structures	None evident

Composition (%)			
Detrital Grains		**Detrital Matrix**	
Mono. Qtz.	74.0	Clay	0.4
Poly. Qtz.	17.6	**Authigenic Clay**	
K-feldspar	0.4	Kaolinite	tr
Plagioclase	tr	Chlorite	
Igneous R.F.		Sericite	tr
Sedim. R.F.	0.4	Undiff. I/S	0.8
Meta. R.F.	1.2	**Cements (non-clay)**	
Chert	tr	Quartz O.G.	0.8
Biotite	tr	Feld. O.G.	
Muscovite	tr	Dolomite	tr
Heavy Min.	2.0	Pyrite	
Glauconite	0.8	Iron Oxide	0.8
Organics	tr	TiO_2	0.8
		Organic	

Photomicrograph Captions

Plate 1A: This soil sample consists of poorly sorted, silty sand. The white grains are nearly all quartz, but with small amounts of feldspar (mostly K-feldspar). Black grains in the upper-left and upper-right corners of the photo are magnetite/ilmenite. The well rounded, green grain in the lower-left quadrant is glauconite. Some quartz is slightly dissolved (pitted grains), as evidenced by traces of blue epoxy within the grains.

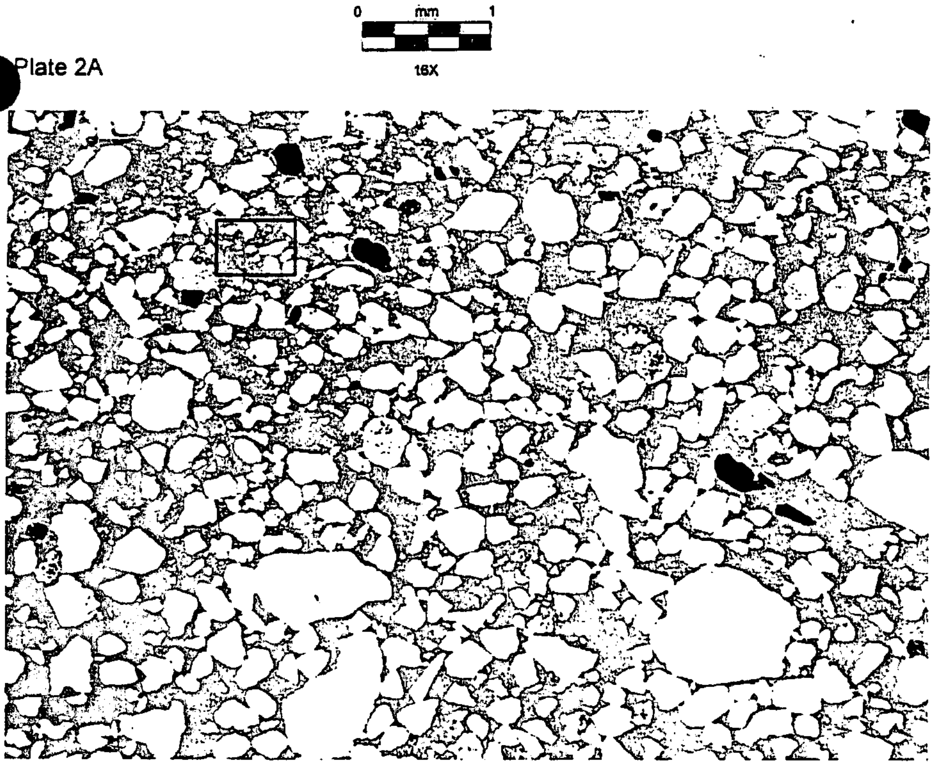
Plate 1B: A high-magnification view of the sample reveals dark-colored coatings on some grains and dark specks between grains. These dark brown to black materials are mostly iron oxide (hematite) and titanium oxide. No lead compounds are identified; however, traces of lead compounds may be associated with these dark crusts and specks. A quartz overgrowth (QO) is observed on top of a hematite grain coating. Tiny white grains between the larger grains are mainly quartz silt, along with small amounts of muscovite/sericite flakes (M).

CORE LAB

Core Laboratories

THIN SECTION PETROGRAPHY

Plate 2A



GeoSyntec Consultants
Soil Samples
NL Industries Project
Sample: SV28071698
Depth: 12 - 16 feet

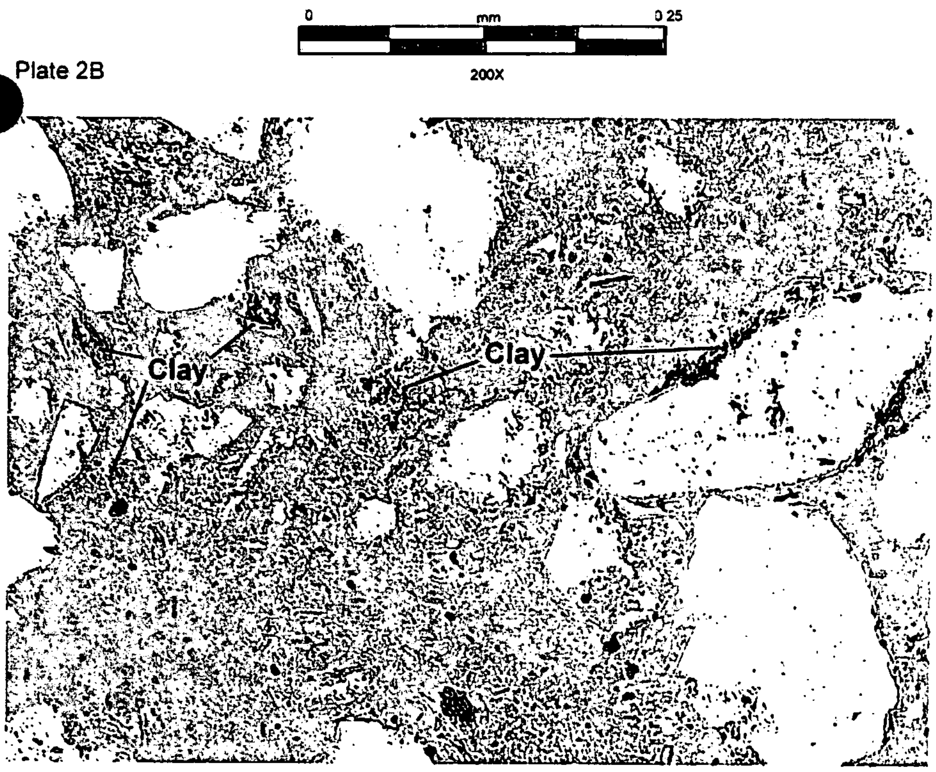
Soil Type & Texture

Classification (Folk)	Silty sand
Grain Size (mm)	Range = <0.01 - 2.18
(estimated)	Avg. = 0.38 (med. sand)
Grain Sorting	Poor
Grain Roundness	Rounded to angular
Compaction	Disaggregated
Structures	None evident

Composition (%)

Detrital Grains		**Detrital Matrix**	
Mono. Qtz.	80.8	Clay	2.8
Poly. Qtz.	10.8	**Authigenic Clay**	
K-feldspar	0.8	Kaolinite	tr
Plagioclase	tr	Chlorite	tr
Igneous R.F.	tr	Sericite	tr
Sedim. R.F.	tr	Undiff. I/S	0.4
Meta. R.F.	0.8	**Cements (non-clay)**	
Chert	1.2	Quartz O.G.	0.4
Biotite		Feld. O.G.	
Muscovite	tr	Dolomite	tr
Heavy Min.	0.4	Pyrite	
Glauconite	tr	Iron Oxide	0.4
Organics		TiO_2	1.2
		Organic	

Plate 2B



Photomicrograph Captions

Plate 2A: This sample is very similar to the previous sample (Plate 1). A lower magnification is provided here, compared to Plate 1A, so that the silty texture of the sand is better observed (upper-left quadrant). Scattered dark grains are heavy minerals. The blackest grains are magnetite/ilmenite.

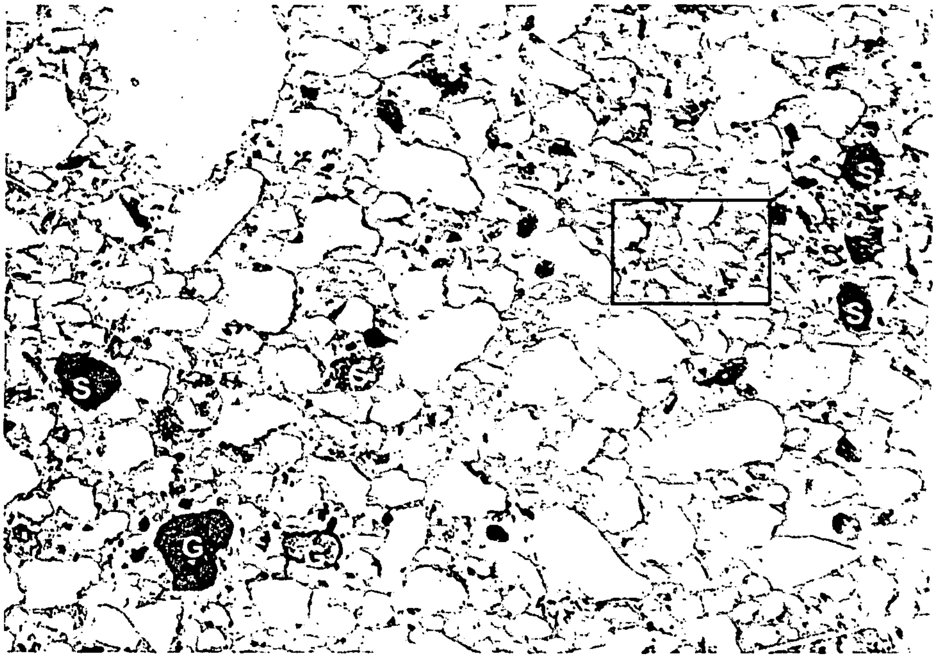
Plate 2B: The area within the black rectangle in Plate 2A is presented in this photomicrograph. The main difference between this sample and SV26072098 is that this sample contains greater (although minor) amounts of clay matrix (yellowish green). This intergranular to grain-coating clay contains many tiny specks of titanium and iron oxides (black). Some of this micron-sized material may include lead compounds, but this cannot be established with thin section analysis. XRD analysis reveals that the clays in this sample are kaolinite and illite/mica.

THIN SECTION PETROGRAPHY

0 mm 1

31X

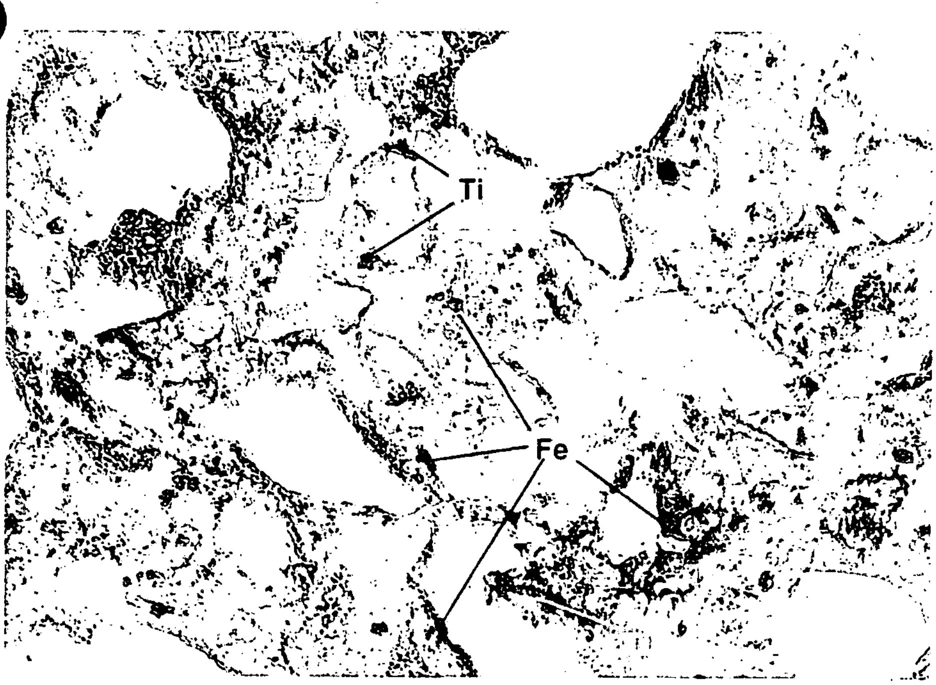
Plate 3A



0 mm 0.25

200X

Plate 3B



GeoSyntec Consultants
Soil Samples
NL Industries Project
Sample: SV29071598
Depth: 10 - 16 feet

Soil Type & Texture

Classification (Folk)	Muddy sand
Grain Size (mm)	Range = <0.01 - 2.02
(estimated)	Avg. = 0.28 (med. sand)
Grain Sorting	Poor
Grain Roundness	Rounded to angular
Compaction	Disaggregated
Structures	None evident

Composition (%)

Detrital Grains		**Detrital Matrix**	
Mono. Qtz.	61.6	Clay	10.8
Poly. Qtz.	7.2	**Authigenic Clay**	
K-feldspar	2.4	Kaolinite	
Plagioclase	1.6	Chlorite	tr
Igneous R.F.	0.8	Sericite	tr
Sedim. R.F.	4.0	Undiff. I/S	tr
Meta. R.F.	2.4	**Cements (non-clay)**	
Chert	0.4	Quartz O.G.	0.8
Biotite	tr	Feld. O.G.	
Muscovite	1.6	Dolomite	
Heavy Min.	1.6	Pyrite	
Glauconite	0.4	Iron Oxide	2.4
Organics		TiO_2	1.6
		Organic	0.4

Photomicrograph Captions

Plate 3A: This is a poorly sorted, muddy sand sample. It is classified as muddy because of the common amounts of silt and clay occurring between the predominant sand grains. The white grains are mostly quartz, with minor amounts of K-feldspar and plagioclase. Various sedimentary argillaceous rock fragments (S) appear dark. Glauconite (G) grains are also noted. The one on the left appears orange due to oxidation.

Plate 3B: The area within the black rectangle in Plate 3A is shown. This sample contains common amounts of clay matrix (greenish brown). This clay coats grains and fills pores. It consists of 78% kaolinite and 22% illite/mica, according to XRD analysis. Within the clay are dark-colored coatings and crystalline specks that are predominantly iron (Fe) and titanium (Ti) oxides. Micron-sized particles of lead compounds may possibly also be present within the clays and oxide coatings.

THIN SECTION PETROGRAPHY

Plate 4A

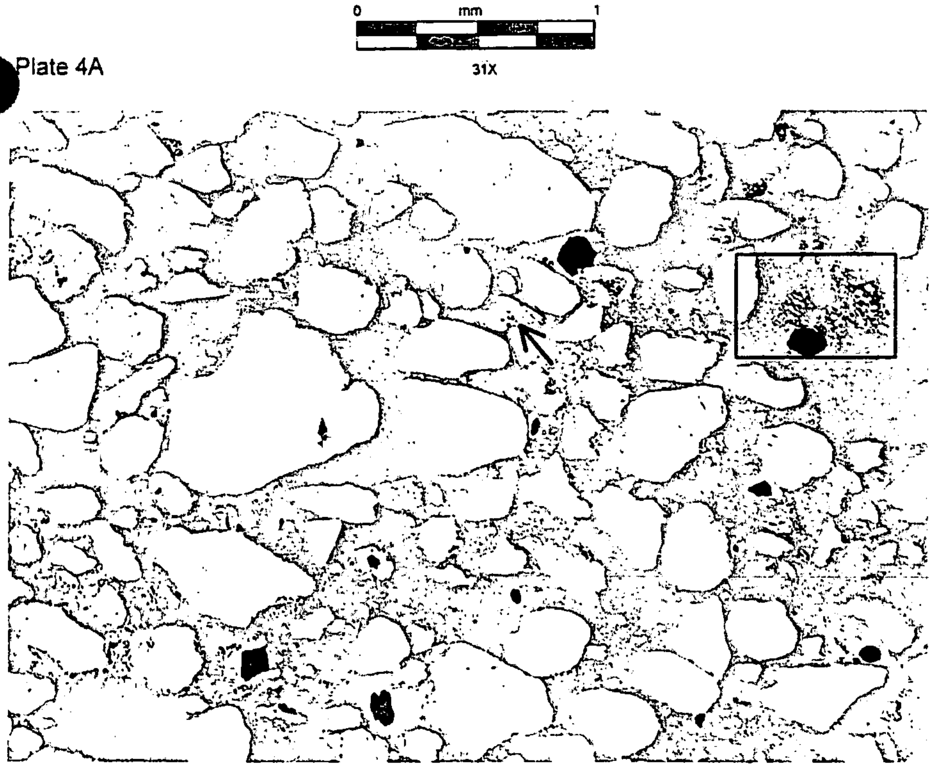
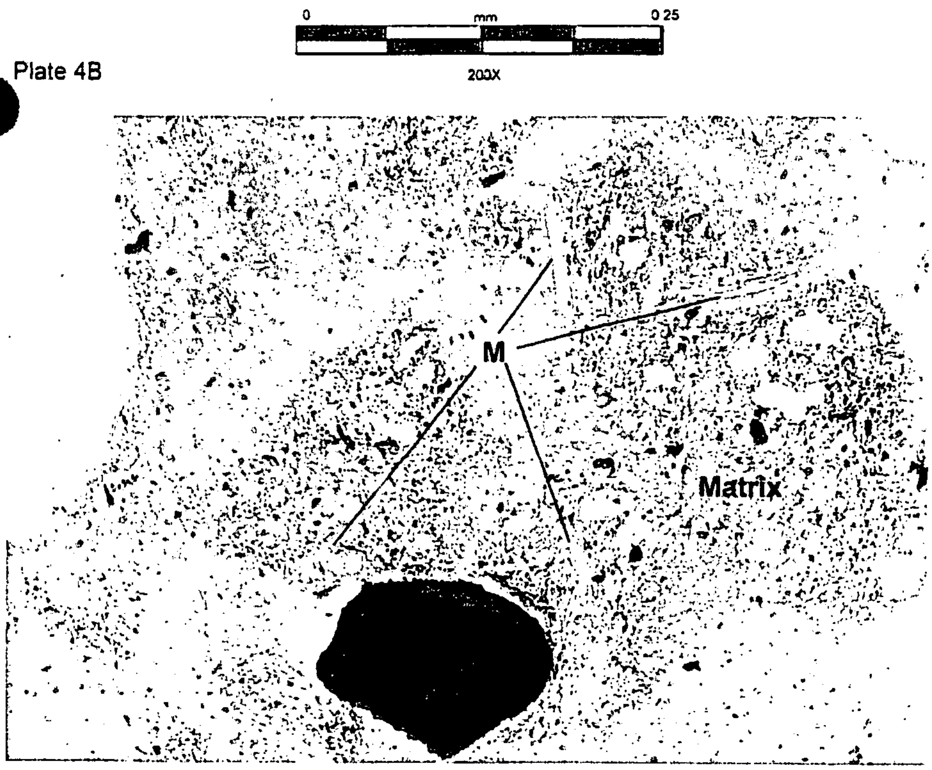


Plate 4B



GeoSyntec Consultants
Soil Samples
NL Industries Project
Sample: SV40
Depth: N.A.

Soil Type & Texture

Classification (Folk)	Silty sand
Grain Size (mm)	Range = <0.01 - 2.05
(estimated)	Avg. = 0.36 (med. sand)
Grain Sorting	Poor
Grain Roundness	Rounded to angular.
Compaction	Disaggregated
Structures	None evident

Composition (%)

Detrital Grains		**Detrital Matrix**	
Mono. Qtz.	76.0	Clay	2.4
Poly. Qtz.	17.2	**Authigenic Clay**	
K-feldspar	1.2	Kaolinite	tr
Plagioclase	tr	Chlorite	tr
Igneous R.F.	tr	Sericite	tr
Sedim. R.F.	0.4	Undiff. I/S	0.4
Meta. R.F.	0.4	**Cements (non-clay)**	
Chert	0.4	Quartz O.G.	tr
Biotite	tr	Feld. O.G.	
Muscovite	tr	Dolomite	
Heavy Min.	0.4	Pyrite	
Glauconite	tr	Iron Oxide	tr
Organics		TiO_2	1.2
		Organic	

Photomicrograph Captions

Plate 4A: Patches of silty clay matrix (light brown) are irregularly distributed in the thin section. This view shows an area where the matrix is relatively common. A slightly dissolved (pitted) feldspar grain is noted by the arrow. Black sand grains are ilmenite/magnetite.

Plate 4B: The portion of Plate 4A within the black rectangle is displayed. The black grain is probably magnetite that has an oxidized rim. The oxidation has stained the adjacent clay matrix brown. Most of the view features a patch of matrix consisting of detrital silt and clay. A few muscovite (M) flakes are part of the silt fraction. The numerous black specks in the matrix are titanium oxide, with traces of iron oxide and possibly other materials. If any lead compounds are present, they would be most likely to occur as very tiny crystals within this matrix. XRD analysis indicates the clay fraction of the matrix is kaolinite and illite/mica.

APPENDIX D

TOXSCAN, INC. LABORATORY REPORT

ToxScan, Inc. 42 Hangar Way • Watsonville, CA 95076-2404 • (408) 724-4522 • FAX (408) 724-3188

October 08, 1998

ToxScan Number: T-16324

GeoSyntec Consultants
10015 Old Columbia Road, Suite A-200
Columbia, MD 21046

Attn: Jeffrey Moore

Project Name:	NL	
Project Number:	ME0015-13	
Date Sampled:	July 15, 1998 - September 23, 1998	
Date Received:	August 14, 1998 - September 23, 1998	
Matrix:	Soil	Soil Extract

Please find the enclosed test results for the parameters requested for analyses. The samples were analyzed within holding time using the following methods:

Carbonate Cadmium by ICP/MS by EPA Method 200.8
Carbonate Lead by ICP/MS by EPA Method 200.8
Carbonate Lead by ICP/MS by EPA Method 200.8
Cation-Exchange Capacity by EPA Method 9081, conducted by Soil Control Lab
Extractable Cadmium by ICP/MS by EPA Method 200.8
Extractable Lead by ICP/MS by EPA Method 200.8
Extractable Lead by ICP/MS by EPA Method 200.8
Iron/Manganese Oxide/Hydroxide Cadmium by ICP/MS by EPA Method 200.8
Iron/Manganese Oxide/Hydroxide Lead by ICP/MS by EPA Method 200.8
Iron/Manganese Oxide/Hydroxide Lead by ICP/MS by EPA Method 200.8
Organic Cadmium by ICP/MS by EPA Method 200.8
Organic Lead by ICP/MS by EPA Method 200.8
Organic Lead by ICP/MS by EPA Method 200.8
[1] Particle Size Distribution by Plumb
Percent Solids by EPA Method 160.3
pH by EPA Method 9045B
Residual Cadmium by ICP/MS by EPA Method 200.8
Residual Lead by ICP/MS by EPA Method 200.8
Residual Lead by ICP/MS by EPA Method 200.8
Total Metals by ICP/MS (Cd,Pb) by EPA Method 6020

This cover letter is an integral part of the report.

[1] Russell H. Plumb, Jr.; Procedures for Handling and Chemical Analysis of Sediment and Water Samples, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station; 1981.

ToxScan, Inc. 42 Hangar Way • Watsonville, CA 95076-2404 • (408) 724-4522 • FAX (408) 724-3188

October 08, 1998

ToxScan Number: T-16324

GeoSyntec Consultants
10015 Old Columbia Road, Suite A-200
Columbia, MD 21046

Attn: Jeffrey Moore

The samples were received intact and were handled with the proper chain-of-custody procedures. Appropriate QA/QC guidelines were employed during the analyses on a minimum of a 5% basis. QC results were within limits and are reported with or following the data for each analysis.

If you have any questions or require any additional information, please feel free to call.

Sincerely,

Philip D. Carpenter

Philip D. Carpenter, Ph.D.
President

Enclosures

This cover letter is an integral part of the report.

[1] Russell H. Plumb, Jr.; Procedures for Handling and Chemical Analysis of Sediment and Water Samples, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station; 1981.

Client:	GeoSyntec Consultants	ToxScan Number: T-16324
Method:	EPA Method(s) 200.8	
Date Completed:	9/29/98	
Matrix:	Soil Extract	
Units:	mg/Kg	

Carbonate Metals

Client Sample ID	**ToxScan Lab ID**	**Analyte**	**Sample Value**	**Reporting Limit**
SV2910-12071598	16324-09	Cadmium	ND	0.1
		Lead	ND	0.1
SV2812-16071698	16324-10	Cadmium	ND	0.1
		Lead	0.17	0.1
SV071698-Dup	16324-11	Cadmium	ND	0.1
		Lead	0.14	0.1
SV26072098	16324-12	Cadmium	ND	0.1
		Lead	ND	0.1

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

A Division of Control Laboratories Inc.

Tel: 831 724-5422
FAX: 831 724-3188

In any reference, please quote Certified Analysis Number appearing hereon.

130152-4-3344

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076

05 OCT 98

CERTIFIED ANALYTICAL REPORT

MATERIAL: Soil samples received 27 August 1998
IDENTIFICATION: T-16324, Quanterra
ID NUMBERS: 1/4-4/4-130152

Sample ID:	Cation Exchange Capacity (C.E.C.)
SV2910-12071598	3.57 meq/100 g dw
Dup	1.70 meq/100 g dw
SV2812-16071698	1.13 meq/100 g dw
Dup	0.89 meq/100 g dw
SV071698-Dup	0.91 meq/100 g dw
Dup	0.91 meq/100 g dw
SV26072098	2.72 meq/100 g dw
Dup	1.83 meq/100 g dw

The undersigned certifies that the above is a true and accurate report of the findings of this Laboratory.

Analyst

Client: GeoSyntec Consultants
Method: EPA Method(s) 200.8
Date Completed: 9/29/98
Matrix: Soil Extract
Units: mg/Kg

ToxScan Number: T-16324

Extractable Metals

Client Sample ID	ToxScan Lab ID	Analyte	Sample Value	Reporting Limit
SV2910-12071598	16324-09	Cadmium	ND	0.1
		Lead	ND	0.1
SV2812-16071698	16324-10	Cadmium	ND	0.1
		Lead	ND	0.1
SV071698-Dup	16324-11	Cadmium	ND	0.1
		Lead	ND	0.1
SV26072098	16324-12	Cadmium	ND	0.1
		Lead	ND	0.1

Client: GeoSyntec Consultants

ToxScan Number: T-16324

Method: EPA Method(s) 200.8
Date Completed: 9/29/98
Matrix: Soil Extract
Units: mg/Kg

Iron/Manganese

Client Sample ID	ToxScan Lab ID	Analyte	Sample Value	Reporting Limit
SV2910-12071598	16324-09	Cadmium	ND	0.1
		Iron	120	0.1
		Lead	0.36	0.1
		Manganese	33	0.1
SV2812-16071698	16324-10	Cadmium	ND	0.1
		Iron	26	0.1
		Lead	ND	0.1
		Manganese	ND	0.1
SV071698-Dup	16324-11	Cadmium	ND	0.1
		Iron	28	0.1
		Lead	ND	0.1
		Manganese	ND	0.1
SV26072098	16324-12	Cadmium	ND	0.1
		Iron	34	0.1
		Lead	0.14	0.1
		Manganese	ND	0.1

Client: GeoSyntec Consultants
Method: EPA Method(s) 200.8
Date Completed: 9/29/98
Matrix: Soil Extract
Units: mg/Kg

ToxScan Number: T-16324

Bound Organic Metals

Client Sample ID	ToxScan Lab ID	Analyte	Sample Value	Reporting Limit
SV2910-12071598	16324-09	Cadmium	ND	0.1
		Lead	ND	0.1
SV2812-16071698	16324-10	Cadmium	ND	0.1
		Lead	ND	0.1
SV071698-Dup	16324-11	Cadmium	ND	0.1
		Lead	ND	0.1
SV26072098	16324-12	Cadmium	ND	0.1
		Lead	ND	0.1

Client:	GeoSyntec Consultants	ToxScan Number: 16324
Method:	Plumb	
Date Analyzed:	August 3 - September 8, 1998	
Matrix:	Sediment	

Client Sample ID:	SV2910-12071598
Client Site ID:	
ToxScan Lab ID:	T-16324-05A

SIZE INTERVAL

Phi	mm	INTERVAL WT (gm)	INTERVAL (%)	CUMULATIVE (%)
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	0.13	0.3	0.3
-1	4- 2	0.08	0.2	0.5
0	2- 1	0.16	0.4	0.9
1	1-0.5	2.26	5.3	6.2
2	0.5-0.25	12.57	29.4	35.6
3	0.25-0.125	16.85	39.5	75.1
4	0.125-0.062	8.01	18.8	93.9
5	0.062-0.031	1.23	2.9	96.7
6	0.031-0.016	0.41	1.0	97.7
7	0.016-0.008	0.29	0.7	98.4
8	0.008-0.004	0.16	0.4	98.7
9	0.004-0.002	0.08	0.2	98.9
>9	< 0.002	0.45	1.1	100

total wt	coarse wt	fine wt
42.7	40.1	2.6

% sand	% silt	% clay
93.9	4.9	1.3

Client:	GeoSyntec Consultants	ToxScan Number: 16324
Method:	Plumb	
Date Analyzed:	August 3 - September 8, 1998	
Matrix:	Sediment	

Client Sample ID:	SV2812-16071698
Client Site ID:	
ToxScan Lab ID:	T-16324-06A

SIZE INTERVAL Phi	mm	INTERVAL WT (gm)	INTERVAL (%)	CUMULATIVE (%)
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	1.33	3.2	3.2
-1	4- 2	0.85	2.1	5.3
0	2- 1	1.43	3.5	8.7
1	1-0.5	6.81	16.5	25.3
2	0.5-0.25	19.83	48.1	73.3
3	0.25-0.125	8.76	21.2	94.5
4	0.125-0.062	0.86	2.1	96.6
5	0.062-0.031	0.25	0.6	97.2
6	0.031-0.016	0.19	0.5	97.7
7	0.016-0.008	0.21	0.5	98.2
8	0.008-0.004	0.12	0.3	98.5
9	0.004-0.002	0.09	0.2	98.7
>9	< 0.002	0.54	1.3	100

total wt	coarse wt	fine wt
41.3	39.9	1.4

% sand	% silt	% clay
96.6	1.8	1.5

Client:	GeoSyntec Consultants	ToxScan Number: 16324
Method:	Plumb	
Date Analyzed:	August 3 - September 8, 1998	
Matrix:	Sediment	

Client Sample ID:	SV071698-Dup
Client Site ID:	
ToxScan Lab ID:	T-16324-07A

SIZE INTERVAL

Phi	mm	INTERVAL WT (gm)	INTERVAL (%)	CUMULATIVE (%)
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	3.01	7.0	7.0
-1	4- 2	1.30	3.0	10.0
0	2- 1	2.20	5.1	15.2
1	1-0.5	7.09	16.5	31.7
2	0.5-0.25	19.35	45.1	76.8
3	0.25-0.125	7.91	18.4	95.2
4	0.125-0.062	0.76	1.8	97.0
5	0.062-0.031	0.20	0.5	97.5
6	0.031-0.016	0.21	0.5	98.0
7	0.016-0.008	0.16	0.4	98.3
8	0.008-0.004	0.13	0.3	98.6
9	0.004-0.002	0.06	0.1	98.8
>9	< 0.002	0.53	1.2	100

total wt	coarse wt	fine wt
42.9	41.6	1.3

% sand	% silt	% clay
97.0	1.6	1.4

Client:	GeoSyntec Consultants	ToxScan Number: 16324
Method:	Plumb	
Date Analyzed:	August 3 - September 8, 1998	
Matrix:	Sediment	

Client Sample ID:	SV26072098
Client Site ID:	
ToxScan Lab ID:	T-16324-08A

SIZE INTERVAL Phi	mm	INTERVAL WT (gm)	INTERVAL (%)	CUMULATIVE (%)
<-5	>32	0.00	0.0	0.0
-4	32-16	0.00	0.0	0.0
-3	16- 8	0.00	0.0	0.0
-2	8- 4	8.39	18.9	18.9
-1	4- 2	0.22	0.5	19.4
0	2- 1	0.31	0.7	20.1
1	1-0.5	2.23	5.0	25.1
2	0.5-0.25	10.95	24.6	49.7
3	0.25-0.125	13.97	31.4	81.1
4	0.125-0.062	5.39	12.1	93.2
5	0.062-0.031	0.76	1.7	94.9
6	0.031-0.016	0.46	1.0	95.9
7	0.016-0.008	0.33	0.8	96.7
8	0.008-0.004	0.31	0.7	97.4
9	0.004-0.002	0.14	0.3	97.7
>9	< 0.002	1.02	2.3	100

total wt	coarse wt	fine wt
44.5	41.5	3.0

% sand	% silt	% clay
93.2	4.2	2.6

Client: GeoSyntec Consultants
Method: EPA Method(s) 160.3
Date Completed: 8/26/98
Matrix: Soil
Units: Percent

ToxScan Number: T-16324

Client Sample ID	ToxScan Lab ID	Analyte	Wet Wt. Sample Value	Wet Reporting Limit
SV2910 - 12071598	16324-05	Percent Solids	83	0.10
SV2812 - 16071698	16324-06	Percent Solids	82	0.10
SV071698 - Dup	16324-07	Percent Solids	84	0.10
SV26072098	16324-08	Percent Solids	80	0.10

Client: GeoSyntec Consultants
Method: EPA Method(s) 9045B
Date Completed: 9/3/98
Matrix: Soil
Units: units

ToxScan Number: T-16324

Client Sample ID	ToxScan Lab ID	Analyte	Sample Value	Reporting Limit
SV2910 - 12071598	16324-05	pH	7.3	0.10
SV2812 - 16071698	16324-06	pH	6.6	0.10
SV071698 - Dup	16324-07	pH	6.0	0.10
SV26072098	16324-08	pH	6.2	0.10

Client: GeoSyntec Consultants
Method: EPA Method(s) 200.8
Date Completed: 9/29/98
Matrix: Soil Extract
Units: mg/Kg

ToxScan Number: T-16324

Residual Metals

Client Sample ID	ToxScan Lab ID	Analyte	Sample Value	Reporting Limit
SV2910-12071598	16324-09	Cadmium	ND	0.1
		Lead	2.2	0.1
SV2812-16071698	16324-10	Cadmium	ND	0.1
		Lead	0.96	0.1
SV071698-Dup	16324-11	Cadmium	ND	0.1
		Lead	0.87	0.1
SV26072098	16324-12	Cadmium	ND	0.1
		Lead	1.6	0.1

Client: GeoSyntec Consultants

Method: EPA Method(s) 6020

Date Completed: 9/10/98

Matrix: Soil

Units: mg/Kg

ToxScan Number: T-16324

Total Metals

Client Sample ID	ToxScan Lab ID	Analyte	Wet Wt. Sample Value	Wet Reporting Limit
SV2910 - 12071598	16324-05	Cadmium	ND	0.10
		Lead	2.8	0.10
SV2812 - 16071698	16324-06	Cadmium	ND	0.10
		Lead	1.9	0.10
SV071698 - Dup	16324-07	Cadmium	ND	0.10
		Lead	2.3	0.10
SV26072098	16324-08	Cadmium	ND	0.10
		Lead	4.1	0.10

XPLANATION OF ACRONYMS FOR PROJECT # T-16324

ollowing is a glossary for acronyms that may be used in this report.

eviation	Definition
	Laboratory Control Sample
	Matrix Spike
)	Matrix Spike Duplicate
	Not Applicable
	None Detected
	Replicate
	Relative Percent Difference
[	Standard Reference Material
	Total Organic Carbon

QC FOR PROJECT # T-16324

LABORATORY METHOD BLANK SUMMARY

Applicable Matrix: Sediment

Total Metals

Analyte	Amount	Reporting Limit mg/L	EPA Method Number
Cadmium	ND	0.10	6020
Iron	ND	1.0	7380
Lead	ND	0.10	6020
Manganese	ND	0.10	6020

QC FOR PROJECT # T-16324

LABORATORY PRECISION SUMMARY:
Matrix: Soil

Analyte	REP 1	REP 2	Units	RPD
pH				
16324-08	6.20	6.19	units	0

ToxScan, Inc. *42 Hangar Way • Watsonville, CA 95076-2404 • (831) 724-4522 • FAX (831) 724-3188*

QC FOR PROJECT # T-16324

Concentrations of the following are in mg/Kg

SRM SUMMARY:

Matrix: Sediment

Total Metals

Analyte	Amount Found	Dilution	Corrected Value	SRM	Certified Value	% Recovery
Cadmium	0.0136	20	0.272	MESS-2	0.240	114
Lead	0.955	20	19.1	MESS-2	21.9	87

QC FOR PROJECT # T-16324

Concentrations of the following are in ug/L

SRM SUMMARY:

Matrix: Water

Total Metals

Analyte	Amount Found	Dilution	Corrected Value	SRM	Certified Value	% Recovery
Cadmium	24.0	5	120	ERA 9977	120	100
Iron	676	1	676	ERA 9977	667	101
Lead	128	5	641	ERA 9977	660	97
Manganese	18.6	5	93.0	ERA 9977	100	93

ERA 9977 = Environmental Resource Associates, WasteWatR Lot No. 9977

APPENDIX E

GROUNDWATER SAMPLING LOGS

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: 31 **Date:** 7/15/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GW31071598

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
830	X										Turbid
1225		X			25.0	0.51	6.27	-110	NR	110.0	Slightly turbid
1530		X			20.7	0.07	6.20	-90	NR	325.0	Turbid
1540		X			21.2	0.36	6.29	-111	NR	45.0	Clear
1550		X			21.5	0.50	6.30	-114	NR	NR	Clear
1552			X								
1605				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/15/98	22.4	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 10.00
Conductivity	7/15/98	22.4	Yes / No	1,000 uS/cm fluid reads 1,170
Redox Potential	7/15/98	22.4	N/A	+231 mv Zoebell solution reads +222

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
735	-	9.42	-
1155	NR	NR	280 ml/min
1605	NR	9.55	NR

Notes:

Depth to bottom: 15 ft below ground surface (bgs) Screened interval: 5 - 15 ft bgs
Set pump intake at 10 ft bgs
Set flow to 280 ml/min; cannot reduce flow any further and sustain yield.
Pump fails at 0855 - reset controller and re-start at 0900; pump fails at 1005 - reset controller and re-start at 1013; pump fails at 1015 -
ʼ new pump at 1145 and resume purge; pump continues to fail. Turn off pump at 1240 due to high pump temperature; resume
‚e at 1300; pump shut off at 1330 due to high pump temperature. Re-start purge at 1510.
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: 32 **Date:** 7/15/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GW32071598

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
740	X										Turbid
820		X			18.7	0.34	5.85	-206	NR	87.4	Clear
900		X			19.3	0.35	5.84	-230	NR	37.5	Clear
910		X			19.1	0.39	5.85	-210	NR	28.3	Clear
925		X			19.1	0.36	6.31	NR	0.63	23.5	Clear
945		X			19.2	0.35	5.94	NR	0.31	19.5	Clear
1000		X			19.1	0.35	5.94	NR	0.28	18.5	Clear

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/15/98	22.4	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 10.00
Conductivity	7/15/98	22.4	Yes / No	1,000 uS/cm fluid reads 1,170
Redox Potential	7/15/98	22.4	N/A	+231 mv Zoebell solution reads +222

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1. Matrix Spike	GW32071598MS
2. Matrix Spike Duplicate	GW32071598MSD
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
740	NR	9.79	225 ml/min
1110	NR	9.81	NR

Notes:

Depth to bottom: 30 ft below ground surface (bgs) Screened interval: 20 - 30 ft bgs
Set pump intake at 25 ft bgs
Set flow to 225 ml/min at 0740
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: 32 **Date:** 7/15/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GW32071598

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1015		X			19.1	0.22	5.93	NR	0.30	16.5	Clear
1030			X		19.2	0.24	5.94	NR	0.28	12.6	Clear
1110				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/15/98	22.4	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 10.00
Conductivity	7/15/98	22.4	Yes / No	1,000 uS/cm fluid reads 1,170
Redox Potential	7/15/98	22.4	N/A	+231 mv Zoebell solution reads +222

QA/QC Information

	Description (i.e., blank, duplicate, etc.)	Sample ID
1.	Matrix Spike	GW32071598MS
2.	Matrix Spike Duplicate	GW32071598MSD
3.		

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
740	NR	9.79	225 ml/min
1110	NR	9.81	NR

Notes:

Depth to bottom: 30 ft below ground surface (bgs) Screened interval: 20 - 30 ft bgs
Set pump intake at 25 ft bgs
Set flow to 225 ml/min at 0740
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: 33 **Date:** 5/19/99 **Performed by:** P. Botek
Sample ID: GW33051999

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1115	X										
1240		X			13.6	1.47	5.2	-112	2.7	59.5	Cloudy
1250		X			13.6	1.46	5.4	-238	1.47	NR	Cloudy
1300		X			13.5	1.45	5.4	-264	1.26	NR	Cloudy
1310		X			13.4	1.43	5.4	-316	1.11	NR	Cloudy
1320		X			13.3	1.42	5.1	-340	1.02	NR	Cloudy
1330		X			13.3	1.42	5.4	-329	0.9	NR	Cloudy
1345		X			13.3	1.42	5.4	-325	1.65	32	Cloudy
1[illegible]			X								

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH		N/A	Yes / No	pH 4: pH 7: pH 10:
Conductivity		N/A	Yes / No	1,000 uS/cm fluid reads
Redox Potential		N/A	N/A	+231 mv Zoebell solution reads

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
1105	N/A	4.05	NA
1200	N/A	4.26	NA
1300	N/A	4.11	NA

Notes:

Field instrument was calibrated with one point calibration solution provided by the manufacturer prior to use

Pump intake set at 8 ft bgs

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: 34 **Date:** 5/20/99 **Performed by:** P. Botek
Sample ID: GW34052099

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
900	X										Cloudy
1330		X			21		5.86	2750		1400	Very Turbid
1320		X	X		21		5.81	2750		1700	Very Turbid
1330		X		X	21		5.80	2710		1100	Very Turbid

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH			Yes / No	pH 4: pH 7: pH 10:
Conductivity			Yes / No	1,000 uS/cm fluid reads
Redox Potential			N/A	+231 mv Zoebell solution reads

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate

Notes:

Field parameter meter was not functioning likely due rainfall

Pump continuously stopped pumping randomly, every restart of pump would cause large quantities of sediments to become suspended in effluent. Malfuntions were due to both generator and submersible pump

[illegible]ots of effluent were retained and pH and conductivity readings were obtained on 21 May 1999 using alternate field instruments

Aliquots of effluent were also submitted to Martel Laboratory Inc. for turbidity readings

Groundwater Sampling Form
ndustries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well 2)
ɩon-012699

Date: 1/26/99
Performed by: P. Botek \ D. Scotti

Sampling Information

End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
	12.2	.362	6.4	-14	13.1	<10	Clear
	12.1	.351	6.4	-50	14.4	<10	Clear
	12.2	.360	6.4	-66	12.2	<10	Clear
	12.0	.357	6.4	-78	11.35	<10	Clear
	12.2	.355	6.4	-91	11.18	<10	Clear
	12.3	.386	6.4	-91	10.94	<10	Clear
	12.2	.380	6.4	-87	11.12	<10	Clear
	12.3	.380	6.4	-86	10.95	<10	Clear
							Clear

Calibration & Checks for YSI Monitor

checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
5/99 @ 0615	18.3	Yes / No	pH 4: 4.0 pH 7: 7.0 pH 10: 9.94
5/99 @ 0615	16.4	Yes / No	1.00 uS/cm fluid reads 0.815
5/99 @ 0615	16.4	N/A	+231 mv Zoebell solution reads +249

QA/QC Information / Miscellaneous

blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
	GW-MS-012699	900		6.73	
	GW-MSD-102699	945	<10	6.69	370 ml/min.
		1100	<10	6.73	300 ml/min.

Laboratory Analytical Parameters

: Analysis, Total Lead and Cadmim, Dissolved Lead and Cadmium, Gamma Spectroscopy

Notes

om TOC.

or was used to monitor conductivity because of air in the flow-thru cell caused fluctuating

ɩsure D.O. and turbidity.

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: BR **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWBR070998

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (	Appearance of Water
1420	X										Clear
1450		X			14.9	1.82	6.69	+105	NR	5.7	Clear
1530		X			14.8	1.85	6.76	+108	NR	4.0	Clear
1545		X			14.9	1.83	6.76	+109	NR	3.8	Clear
1555		X			14.8	1.86	NR	+109	0.90	1.3	Clear
1605		X			14.8	1.87	NR	+108	0.95	2.1	Clear
1615		X			14.9	1.83	NR	+108	0.93	0.5	Clear
1616			X								
[illegible]				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	21.4	Yes / No	pH 4: 4.0 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	21.4	Yes / No	1,000 uS/cm fluid reads 991
Redox Potential	7/9/98	21.4	N/A	+231 mv Zoebell solutio n reads +234

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
1415	-	5.25	-
1430	NR	NR	275 ml/min
1630	NR	5.28	NR

Notes:

Depth to bottom: 38.85 ft below ground surface (bgs)

Screened interval: 32.85 - 38.85 ft bgs

Set pump intake at 36 ft bgs

Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: JD **Date:** 7/8/98 **Performed by:** P. Botek/D. Scotti
Sample ID: GWJD070898

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
850	X										Clear
910		X			17.0	0.220	3.54	+397	NR	NR	Clear
925		X			17.4	0.225	3.57	+398	NR	11.5	Clear
935		X			17.5	0.610	3.57	+398	NR	10.5	Clear
1015		X			17.5	0.315	NR	+398	2.58	4.45	Clear
1025		X			17.2	0.320	NR	+398	2.70	3.30	Clear
1035		X			17.0	0.369	NR	+398	2.63	2.60	Clear
1050			X								
[illegible]				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/8/98	21.6	Yes / No	pH 4: 4.0 pH 7: 7.00 pH 10: 9.79
Conductivity	7/8/98	21.6	Yes / No	1,000 uS/cm fluid reads 928
Redox Potential	7/8/98	21.6	N/A	+231 mv Zoebell solutio n reads +229

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
832	-	7.78	-
853	NR	NR	500 ml/min
855	NR	NR	350 ml/min

Notes:

Depth to bottom: 27.44 ft below ground surface (bgs) Screened interval: 17.44 - 27.44 ft bgs
Set pump intake at 22 ft bgs
Set flow to 300 ml/min at 0856
Depth to water: 7.83 at 1057
NR Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: JS **Date:** 7/8/98 **Performed by:** P. Botek/D. Scotti
Sample ID: GWJS070898

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1005	X										
1024		X			18.9	0.040	5.32	+195	NR	NR	Brown, turbid
1034		X			18.8	0.068	5.27	+210	NR	NR	Clearing
1103		X			19.1	0.075	5.27	+205	NR	NR	Clearing
1120		X			19.0	0.079	NR	+220	2.10	40.3	Clear
1135		X			18.8	0.086	NR	+247	2.35	29.4	Clear
1150		X			18.7	0.087	NR	+268	2.28	20.7	Clear
1205		X			18.6	0.090	NR	+273	2.84	15.6	Clear
[illegible]		X			18.7	0.090	NR	+276	2.93	23.0	Clear

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/8/98	21.5	Yes / No	pH 4: 4.02 pH 7: 7.02 pH 10: 10.01
Conductivity	7/8/98	21.5	Yes / No	1,000 uS/cm fluid reads 1,000
Redox Potential	7/8/98	21.5	N/A	+231 mv Zoebell solution reads +230

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
835	-	7.68	-
1013	NR	7.98	300 ml/min
1220	NR	7.65	NR

Notes:

Depth to bottom: 17 ft below ground surface (bgs) Screened interval: 7 - 17 ft bgs
Set pump intake at 10 ft bgs (cannot deploy any deeper)
Set flow to 300 ml/min at 1008
Organic debris (roots) on pump when pull pump
Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: JS **Date:** 7/8/98 **Performed by:** P. Botek/D. Scotti
Sample ID: GWJS070898

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1225			X								Clear
1230				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/8/98	21.5	Yes / No	pH 4: 4.02 pH 7: 7.02 pH 10: 10.01
Conductivity	7/8/98	21.5	Yes / No	1,000 uS/cm fluid reads 1,000
Redox Potential	7/8/98	21.5	N/A	+231 mv Zoebell solution reads +230

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
835	-	7.68	-
1013	NR	7.98	300 ml/min
1220	NR	7.65	NR

Notes:

Depth to bottom: 17 ft below ground surface (bgs) Screened interval: 7 - 17 ft bgs
Set pump intake at 10 ft bgs (cannot deploy any deeper)
Set flow to 300 ml/min at 1008
Organic debris (roots) on pump when pull pump
Not recorded

Groundwater Sampling Form
...stries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Date: 7/13/98 **Performed by:** P. Botek/J. Latimer

)071398

Sampling Information

Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
						Slight rust color
20.9	0.90	5.21	+128	NR	97	Clear - rusty tint
20.0	0.18	5.16	+143	NR	77	Clear - rusty tint
19.8	0.22	5.22	+133	NR	51.5	Clear
19.7	1.80	5.22	+125	NR	36.0	Clear
19.7	1.85	5.24	+119	0.99	32.5	Clear
19.4	1.10	5.23	+121	0.27	28.0	Clear

Calibration & Checks for YSI Monitor

ı last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
7/13/98	22.8	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.98
7/13/98	22.8	Yes / No	1,000 uS/cm fluid reads 1,210
7/13/98	22.8	N/A	+231 mv Zoebell solution reads +232

)A/QC Information

blank, duplicate, etc.)	Sample ID

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
845	-	7.92	-
900	NR	NR	250 ml/min
1230	NR	7.96	NR

·v ground surface (bgs) Screened interval: 14 - 24 ft bgs

)00

5; replace generator and resume purge at 1045.

Groundwater Sampling Form
stries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Date: 7/13/98 **Performed by:** P. Botek/J. Latimer

)071398

Sampling Information

Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
20.0	0.30	NR	+123	NR	26.5	Clear
19.9	0.62	NR	+124	0.25	23.5	Clear
19.5	0.39	NR	+125	0.30	18.8	Clear
						Clear

Calibration & Checks for YSI Monitor

ı last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
7/13/98	22.8	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.98
7/13/98	22.8	Yes / No	1,000 uS/cm fluid reads 1,210
7/13/98	22.8	N/A	+231 mv Zoebell solution reads +232

A/QC Information

blank, duplicate, etc.)	Sample ID

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
845	-	7.92	-
900	NR	NR	250 ml/min
1230	NR	7.96	NR

v ground surface (bgs) Screened interval: 14 - 24 ft bgs

)00

5; replace generator and resume purge at 1045.

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: NS **Date:** 7/13/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GWNS071398

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
845	X										Very cloudy
900		X			23.6	0.29	5.77	+9	NR	22.5	Clear
925		X			23.6	0.06	5.85	-12	NR	13.8	Clear
950		X			22.6	0.07	5.85	+53	NR	4.0	Clear
1005		X			23.5	0.06	5.86	+108	1.24	4.8	Clear
1020		X			24.8	0.11	NR	+150	1.19	4.6	Clear
1030		X			25.2	0.21	NR	+178	1.14	4.0	Clear
1035			X								Clear
[illegible]				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/13/98	21.0	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.97
Conductivity	7/13/98	21.0	Yes / No	1,000 uS/cm fluid reads 1,020
Redox Potential	7/13/98	21.0	N/A	+231 mv Zoebell solution reads +246

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
840	-	8.71	-
855	NR	NR	280 ml/min

Notes:

Depth to bottom: 16.5 ft below ground surface (bgs) Screened interval: 6.5 - 16.5 ft bgs
Set pump intake at 14.5 ft bgs
Set flow to 280 ml/min at 0855
NR = Not recorded

ME0015-11/MD98489.NS

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OD **Date:** 7/14/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GWOD071498

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
735	X										Slightly turbid, organic odor
800		X			17.5	9.13	4.03	-51	NR	59.5	Clear, organic odor
820		X			17.4	7.64	4.00	-67	NR	32.1	Clear, strong organic odor
850		X			17.3	6.45	3.99	-67	NR	16.2	Clear, strong organic odor
905		X			17.3	6.13	3.99	-72	NR	10.9	Clear, strong organic odor
925		X			17.4	4.50	3.96	NR	0.98	8.8	Clear, strong organic odor
940		X			17.4	4.21	3.93	NR	0.55	6.4	Clear, strong organic odor
1000		X			17.5	5.40	3.93	NR	0.52	4.0	Clear, strong organic odor

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/14/98	20.2	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 10.00
Conductivity	7/14/98	20.2	Yes / No	1,000 uS/cm fluid reads 1,130
Redox Potential	7/14/98	20.2	N/A	+231 mv Zoebell solution reads +229

QA/QC Information		Miscellaneous			
Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		730	-	8.53	-
2.		745	NR	NR	250 ml/min
3.		1020	NR	8.52	NR

Notes:

Depth to bottom: 34.7 ft below ground surface (bgs) Screened interval: 9.7 - 34.7 ft bgs

Set pump intake at 25 ft bgs

Set flow to 250 ml/min at 0745

NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OD **Date:** 7/14/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GWOD071498

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1010		X			17.5	5.38	3.93	NR	0.60	4.7	Clear, strong organic odor
1012			X								Clear, strong organic odor
1025				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/14/98	20.2	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 10.00
Conductivity	7/14/98	20.2	Yes / No	1,000 uS/cm fluid reads 1,130
Redox Potential	7/14/98	20.2	N/A	+231 mv Zoebell solution reads +229

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
730	-	8.53	-
745	NR	NR	250 ml/min
1020	NR	8.52	NR

Notes:

Depth to bottom: 34.7 ft below ground surface (bgs) Screened interval: 9.7 - 34.7 ft bgs
Set pump intake at 25 ft bgs
Set flow to 250 ml/min at 0745
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OS **Date:** 7/13/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GWOS071398

Sampling Information											
Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1315	X										
1330		X			17.6	2.78	4.74	+128	NR	34.5	Clear
1345		X			18.0	2.95	4.61	+76	NR	25.0	Clear
1400		X			19.6	2.79	4.57	+61	NR	26.5	Clear
1415		X			19.7	3.74	4.54	+47	NR	24.4	Clear
1435		X			19.2	4.05	4.51	+31	NR	20.5	Clear
1450		X			19.4	4.20	4.50	+22	NR	20.5	Clear
1510		X			19.1	4.37	4.48	+7	NR	14.8	Clear
15[illegible]		X			19.4	4.45	NR	-1	1.17	10.5	Clear

Calibration & Checks for YSI Monitor				
	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/13/98	21.0	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.97
Conductivity	7/13/98	21.0	Yes / No	1,000 uS/cm fluid reads 1,020
Redox Potential	7/13/98	21.0	N/A	+231 mv Zoebell solution reads +246

QA/QC Information		Miscellaneous			
Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		1325	-	7.77	250 ml/min
2.		1555	NR	7.72	NR
3.					

Notes:

Depth to bottom: 19 ft below ground surface (bgs) Screened interval: 4 - 19 ft bgs
Set pump intake at 16.5 ft bgs
Set flow to 250 ml/min at 1325
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OS **Date:** 7/13/98 **Performed by:** P. Botek/J. Latimer
Sample ID: GWOS071398

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1530		X			19.6	4.53	NR	-5	0.50	13.9	Clear, yellow tint
1540		X			19.3	4.58	NR	-12	0.30	10.4	Clear, yellow tint
1550		X			19.2	4.66	NR	-14	0.38	11.8	Clear
1555			X								Clear
1605				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/13/98	21.0	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.97
Conductivity	7/13/98	21.0	Yes / No	1,000 uS/cm fluid reads 1,020
Redox Potential	7/13/98	21.0	N/A	+231 mv Zoebell solution reads +246

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
1325	-	7.77	250 ml/min
1555	NR	7.72	NR

Notes:

Depth to bottom: 19 ft below ground surface (bgs) Screened interval: 4 - 19 ft bgs
Set pump intake at 16.5 ft bgs
Set flow to 250 ml/min at 1325
NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OS **Date:** 9/24/98 **Performed by:** D.Scotti/B. Steier
Sample ID: GWOS092498

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
906	X				16.2	1.18	4.32	+206	NR	NR	Brown, very turbid
915		X			16.7	1.23	4.30	+186	NR	NR	Brown, turbid
924		X			17.3	1.34	4.23	+87	NR	NR	Brown, less turbid
930		X			17.5	1.25	4.17	+74	NR	NR	Brown
940		X			18.3	0.96	4.13	+56	NR	26.5	Brown
953		X			19.1	1.16	4.14	+44	NR	20.8	Clear
1005		X			18.6	1.24	4.15	+23	NR	15.2	Clear
1017		X			19.2	1.22	4.12	+6	NR	12.5	Clear
[illegible]		X			19.4	1.20	4.11	+1	NR	9.5	Clear

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	9/24/98	8.2	Yes / No	pH 4: 4.01 pH 7: 7.02 pH 10: 9.98
Conductivity	9/24/98	8.2	Yes / No	1,000 uS/cm fluid reads 1,064
Redox Potential	9/24/98	8.2	N/A	+231 mv Zoebell solution reads +250

QA/QC Information / Miscellaneous

Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		852	NR	8.79	NR
2.		923	39.2	NR	600 ml/min
3.		930	NR	8.88	200 ml/min

Notes:

Depth to bottom: 19 ft below ground surface (bgs) Screened interval: 4 - 19 ft bgs

Set pump intake at 17 ft bgs

Set flow to 200 ml/min at 0930; difficult to maintain constant flow, attempt to maintain flow at 200 ml/min.

NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: OS **Date:** 9/24/98 **Performed by:** D. Scotti/B. Steier
Sample ID: GWOS092498

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1039		X			19.6	1.20	4.10	-5	NR	7.8	Clear, yellow tint
1050		X			20.0	1.33	NR	-11	5.0	NR	Clear, yellow tint
1101		X			20.0	1.33	NR	-15	5.4	8.2	Clear
1111		X			19.3	1.31	NR	-21	5.4	5.5	Clear
1139		X			19.4	6.59	NR	-25	3.7	14.0	Clear
1148		X			19.3	6.63	NR	-31	8.3	6.0	Clear
1158		X			19.2	6.58	NR	-36	12.5	4.9	Clear
1208		X	X		19.3	6.62	NR	-39	12.6	4.6	Clear
[illegible]				X							Clear

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	9/24/98	8.2	Yes / No	pH 4: 4.01 pH 7: 7.02 pH 10: 9.98
Conductivity	9/24/98	8.2	Yes / No	1,000 uS/cm fluid reads 1,064
Redox Potential	9/24/98	8.2	N/A	+231 mv Zoebell solution reads +250

QA/QC Information

	Description (i.e., blank, duplicate, etc.)	Sample ID
1.		
2.		
3.		

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
852	NR	8.79	NR
923	39.2	NR	600 ml/min
930	NR	8.88	200 ml/min

Notes:

Depth to bottom: 19 ft below ground surface (bgs) Screened interval: 4 - 19 ft bgs
Set pump intake at 17 ft bgs
Set flow to 200 ml/min at 0930; difficult to maintain constant flow, attempt to maintain flow at 200 ml/min
NR = Not recorded
[illegible]0 generator fails; pump off; @ 1130 generator and pump on - turbid discharge

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SD **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSD070998

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
840	X										Very Turbid
930		X			16.9	9.07	2.96	193		339	
1005		X			16.7	8.90	2.95	291		50	Slightly Turbid
1020		X			16.7	8.78	2.95	310		23	Slightly Turbid
1050		X			16.7	8.08	2.97	305		37	Slightly Turbid
1120		X			16.8	8.75	2.97	308		14	Clear
1130		X			16.7	8.79	2.96	310		12.2	Clear
1150		X			16.8	8.74	2.96	309		12.7	Clear
[illegible]			X								Clear
[illegible]				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	21.4	Yes / No	pH 4: 4.0 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	21.4	Yes / No	1,000 uS/cm fluid reads 1034
Redox Potential	7/9/98	21.4	N/A	+231 mv Zoebell solutio n reads +238

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
828		7.07	
840			250 ml/min
1210			

Notes:

Depth to bottom: 28.96 ft.

Screened interval: 16 - 28 ft.

Orion 810 D.O. meter was not functioning due to broken connection between probe and display. Therfore,no D.O. data was obtained for well SD at this time.

Sample split w/ Foster Wheeler

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SD **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSD070998

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
840	X										Very turbid
930		X			16.9	9.07	2.96	+193	*	339	
1005		X			16.7	8.90	2.95	+291	*	50	Slightly turbid
1020		X			16.7	8.78	2.95	+310	*	23	Slightly turbid
1050		X			16.7	8.08	2.97	+305	*	37	Slightly turbid
1120		X			16.8	8.75	2.97	+308	*	14	Clear
1130		X			16.7	8.79	2.96	+310	*	12.2	Clear

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	21.4	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	21.4	Yes / No	1,000 uS/cm fluid reads 1,034
Redox Potential	7/9/98	21.4	N/A	+231 mv Zoebell solution r n reads +238

QA/QC Information		Miscellaneous			
Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		828	-	7.07	-
2.		840	NR	NR	250 ml/min
3.					

Notes:

Depth to bottom: 28.96 ft below ground surface (bgs) Screened interval: 16.96 - 28.96 ft bgs

Sample split w/ USEPA oversight contractor (Foster-Wheeler)

* Orion 810 dissolved oxygen (D.O.) meter was not functioning due to a broken connection between the probe and display; therefore, no D.O. data could be obtained for well SD at this time.

NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SD **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSD070998

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
1150		X			16.8	8.74	2.96	+309	*	12.7	Clear
1155			X								Clear
1205				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	21.4	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	21.4	Yes / No	1,000 uS/cm fluid reads 1,034
Redox Potential	7/9/98	21.4	N/A	+231 mv Zoebell solution r n reads +238

QA/QC Information / Miscellaneous

Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		828	-	7.07	-
2.		840	NR	NR	250 ml/min
3.					

Notes:

Depth to bottom: 28.96 ft below ground surface (bgs) Screened interval: 16.96 - 28.96 ft bgs

Sample split w/ USEPA oversight contractor (Foster-Wheeler)

* Orion 810 dissolved oxygen (D.O.) meter was not functioning due to a broken connection between the probe and display; therefore, no D.O. data could be obtained for well SD at this time.

NR = Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SS **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSS070998

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
900	X										Vey Turbid, Odor
950		X			19.4	0.13	3.85	-149		730	Very Turbid
1010		X			20.5	0.30	3.76	-155		250	Turbid
1025		X			19.8	0.16	5.89	-141		992	Turbid
1050		X			18.6	0.6	5.90	-102		207	Turbid
1110		X			18.0	0.80	5.89	-97		140	Turbid
1205		X			19.8	0.13		-88			

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	18.0	Yes / No	pH 4: 4.0 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	18.0	Yes / No	1,000 uS/cm fluid reads 0.991
Redox Potential	7/9/98	18.0	N/A	+231 mv Zoebell solutio n reads +234

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
830		64.05	
910			275 ml/min

Notes:

Depth to bottom: 16.77 ft. Well extremely turbid. Well was surged from 1225 to 1425 w\little improvement.

Screened interval: 6 -16 ft. Screen is possibly Breached. Low flow purging resumed at 1430.

Pump intake set at 11.5 ft.

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SS **Date:** 7/9/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSS071098

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
900	X										Vey turbid, odor
950		X			19.4	0.13	3.85	-149	NR	730	Very turbid
1010		X			20.5	0.30	3.76	-155	NR	250	Turbid
1025		X			19.8	0.16	5.89	-141	NR	992	Turbid
1050		X			18.6	0.60	5.90	-102	NR	207	Turbid
1110		X			18.0	0.80	5.89	-97	NR	140	Turbid
1205		X			19.8	0.13	NR	-88	NR	NR	Turbid

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/9/98	18.0	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.96
Conductivity	7/9/98	18.0	Yes / No	1,000 uS/cm fluid reads 991
Redox Potential	7/9/98	18.0	N/A	+231 mv Zoebell solution r n reads +234

QA/QC Information / Miscellaneous

Description (i.e., blank, duplicate, etc.)	Sample ID	Time	Turbidity	Depth to Water	Purge Rate
1.		830	-	6.05	-
2.		910	NR	NR	275 ml/min
3.					

Notes:

Depth to bottom: 16.77 ft below ground surface (bgs) Screened interval: 6.77 -16.77 ft bgs

Pump intake set at 11.5 ft bgs

Well is extremely turbid. Decide to stop recording measurements and to surge the well. Well surged from 1225 to 1425 with little improvement. Screen is possibly breached. Low flow purging resumed at 1430. Abundant silt is still being pumped from the well. Decide to purge the well for the rest of the day and to turn off the pump at the end of the day and resume purging tomorrow.

Not recorded

Groundwater Sampling Form
NL Industries, Inc. Superfund Site, Pedricktown, New Jersey
GeoSyntec Project Number ME0015

Well ID: SS **Date:** 7/10/98 **Performed by:** P. Botek/ J. Latimer
Sample ID: GWSS071098

Sampling Information

Time	Start Purge	Readings	Start Sample	End Sample	Temp. (°C)	Conductivity (mS/cm) (ATC)	pH (ATC)	Redox (+/-mv)	D.O. (ppm)	Turbidity (NTU)	Appearance of Water
848	X										Slightly turbid
920		X			17.3	4.37	5.55	+53	NR	25	Clear
950		X			20.5	4.20	5.51	+10	NR	95	Slightly turbid
1024		X			17.0	0.92	5.54	+26	NR	25	Clear
1115		X			17.7	0.99	5.52	+29	NR	5.9	Clear
1140		X			17.7	1.01	5.52	+34	NR	NR	Clear
1145			X								
1155				X							

Calibration & Checks for YSI Monitor

	When last checked?	Temp. (°C)	ATC	(enter only if calibration performed now)
pH	7/10/98	23.0	Yes / No	pH 4: 4.00 pH 7: 7.00 pH 10: 9.94
Conductivity	7/10/98	23.0	Yes / No	1,000 uS/cm fluid reads 1,091
Redox Potential	7/10/98	23.0	N/A	+231 mv Zoebell solution r n reads +216

QA/QC Information

Description (i.e., blank, duplicate, etc.)	Sample ID
1.	
2.	
3.	

Miscellaneous

Time	Turbidity	Depth to Water	Purge Rate
845	-	6.53	-
915	NR	NR	300 ml/min
1020	NR	6.82	500 ml/min

Notes:

0950: Pumn stopped and restarted.

1020: Pump had stopped,flow rate increased to 500 ml/min may have caused variations in conductivity.

1040:Pump stepped down to 375 ml/min

NR = Not recorded

Dissolved oxygen (D.O.) meter not functioning; therefore D.O. readings could not be obtained.

APPENDIX F

EPA LABORATORY QUALIFIERS

ORGANIC ANALYSES

U: This flag indicates the compound was analyzed for but not detected.

J: This flag indicates an estimated value. This flag is used: (i) when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed; and (ii) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the CRQL but greater than zero. For example, if the sample quantitation limit is 10 ug/L, but a concentration of 3 ug/L is calculated, report it as 3J.

N: This flag indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N flag is not used.

C: This flag applies to pesticide results where the identification has been confirmed by GC/MS. If GC/MS confirmation was attempted but was unsuccessful, do not apply this flag; use a laboratory-defined flag instead (see the X qualifier).

B: This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates probable blank contamination and warns the data user to take appropriate action. This flag shall be used for a tentatively identified compound as well as for a positively identified target compound.

The combination of flags UB is expressly prohibited. Blank contaminates are flagged B only when they are detected in the sample.

E: This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a response greater than the upper level of the calibration range, the sample or extract shall be diluted and reanalyzed. All such compounds with a response greater than the upper level of the calibration range shall have the concentration flagged with an E on Form I for the original analysis. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses shall be reported on separate copies of Form I. The Form I for the diluted sample shall have the DL suffix appended to the sample number.

Note: For total xylenes, where three isomers are quantified as two peaks, the calibration range of each peak shall be considered separately, For example, a diluted analysis is not required for total xylenes unless the concentration of the peak representing the single isomer exceeds 200 ug/L or the peak representing the two co-eluting isomers on that GC column exceeds 400 ug/L. Similarly, if the two 1,2-Dichloroethene isomers coelute, a dilted analysis is not required unless the concentration exceeds 400 ug/L.

D: This flag is used for all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the E flag, the DL suffix is appended to the sample number on Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the D flag. This flag alerts data users that any discrepancies between the reported concentrations may be due to dilution of the sample or extract.

X: Other specific flags may be required to properly define the results. If used, the flags shall be fully described, with the description attached to the sample data summary package and the SDG narrative. Begin by using X. If more than one flag is required for a sample result, use the X flag to represent a combination of several flags. For instance, the X flag might combine the A, B, and D flags for some samples. The laboratory-defined flags for limited to X, Y, and Z.

INORGANIC ANALYSES

C: (Concentration) qualifier-- specified entries and their meanings are as follows:

B: The reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). If the analyte was analyzed for but not detected, a "U" shall be entered.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Q: Qualifier -- Specified entries and their meanings are as follows:

E: The reported value is estimated because of the presence of interference. An explanatory note shall be included under Comments on the Cover Page if the problem applies to all samples) or on the specific FORM I-IN (if it is an isolated problem).

M: Duplicate injection precision not met.

N: Spiked sample recovery not within control limits.

S: The reported value was determined by the Method of Standard Additions (MSA).

W: Post-digestion spike for Furnace AA analysis is out of while sample absorbance is less than 50% of spike absorbance.

* Duplicate analysis not within control limits.

+ Correlation coefficient for the MSA is less than 0.995.

Entering "S", "W", or "+" is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

M: (Method) qualifier -- Specified entries and their meanings are as follows:

"P" for ICP;
"A" for Flame AA;
"P" for Furnace AA;
"PM" for ICP when Microwave Digestion is used;
"AM" for flame AA when Microwave Digestion is used;
"CV" for Manual Cold Vapor AA;
"CA" for Midi-Distillation Spectrophotometric;
"AS" for Semi-Automated Spectrophotometric;
"C" For Manual Spectrophotometric;
"T" for Titrimetric;
" " where no data has been entered; and
"NR" if the analyte is not required to be analyzed.

APPENDIX G

RAW TRANSDUCER DATA

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
0	0.091	-0.092	-0.031	-0.076	-0.249	-0.253
1	0.094	-0.095	-0.022	-0.066	-0.259	-0.256
2	0.078	-0.098	-0.031	-0.073	-0.243	-0.246
3	-0.161	-0.083	-0.031	-0.057	-0.243	-0.249
4	1.676	0.277	-0.022	0.146	-0.246	-0.249
5	2.765	0.447	0.006	0.273	-0.237	-0.237
6	3.266	0.688	0.072	0.473	-0.224	-0.227
7	3.481	0.824	0.192	0.597	-0.233	-0.237
8	2.03	0.713	0.309	0.587	-0.243	-0.24
9	1.521	0.512	0.362	0.454	-0.249	-0.243
10	1.436	0.444	0.372	0.393	-0.246	-0.237
11	1.414	0.419	0.365	0.365	-0.23	-0.224
12	1.357	0.395	0.359	0.349	-0.218	-0.211
13	1.335	0.379	0.346	0.333	-0.224	-0.218
14	1.335	0.373	0.337	0.323	-0.23	-0.224
15	1.313	0.367	0.328	0.32	-0.218	-0.208
16	1.865	0.46	0.328	0.368	-0.224	-0.218
17	1.91	0.5	0.34	0.406	-0.227	-0.218
18	1.925	0.521	0.359	0.425	-0.221	-0.215
19	2.61	0.617	0.362	0.482	-0.221	-0.211
20	2.901	0.747	0.419	0.574	-0.218	-0.205
21	2.983	0.818	0.463	0.647	-0.214	-0.202
22	3.011	0.858	0.507	0.685	-0.202	-0.192
23	3.052	0.886	0.548	0.714	-0.214	-0.202
24	3.068	0.907	0.586	0.736	-0.208	-0.192
25	3.09	0.923	0.618	0.752	-0.221	-0.202
26	3.096	0.941	0.646	0.771	-0.214	-0.199
27	3.14	0.957	0.665	0.784	-0.208	-0.189
28	3.15	0.969	0.684	0.8	-0.208	-0.189
29	3.147	0.985	0.706	0.812	-0.195	-0.177
30	3.162	0.997	0.719	0.822	-0.18	-0.164
31	3.194	1.006	0.734	0.832	-0.202	-0.18
32	3.178	1.012	0.744	0.838	-0.186	-0.17
33	3.194	1.018	0.758	0.844	-0.183	-0.164
34	3.5	1.077	0.766	0.879	-0.183	-0.158
35	3.585	1.114	0.785	0.917	-0.183	-0.161
36	3.661	1.148	0.807	0.946	-0.176	-0.151
37	3.708	1.173	0.829	0.968	-0.183	-0.158
38	3.724	1.185	0.842	0.981	-0.18	-0.155
39	3.733	1.204	0.867	0.997	-0.164	-0.142
40	3.752	1.216	0.883	1.006	-0.164	-0.136
41	3.784	1.219	0.895	1.013	-0.164	-0.136
42	3.759	1.228	0.908	1.025	-0.173	-0.145
43	3.768	1.241	0.92	1.038	-0.161	-0.132
44	3.781	1.25	0.93	1.041	-0.164	-0.136

GeoSynetc Consultants

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
45	3.812	1.256	0.939	1.047	-0.17	-0.139
46	3.803	1.262	0.946	1.057	-0.151	-0.123
47	3.781	1.269	0.955	1.06	-0.148	-0.12
48	3.822	1.272	0.961	1.063	-0.145	-0.117
49	3.774	1.265	0.965	1.063	-0.158	-0.126
50	3.793	1.269	0.971	1.066	-0.145	-0.12
51	3.774	1.272	0.974	1.07	-0.151	-0.12
52	3.771	1.278	0.984	1.076	-0.132	-0.101
53	3.771	1.284	0.984	1.076	-0.148	-0.117
54	3.793	1.287	0.99	1.082	-0.145	-0.113
55	3.803	1.29	0.99	1.086	-0.142	-0.107
56	3.79	1.29	0.993	1.086	-0.142	-0.11
57	3.796	1.293	0.999	1.089	-0.126	-0.094
58	3.818	1.296	1.002	1.092	-0.132	-0.101
59	3.8	1.299	1.006	1.095	-0.132	-0.101
60	4.355	1.389	1.012	1.149	-0.113	-0.079
61	4.427	1.441	1.034	1.197	-0.126	-0.091
62	4.478	1.469	1.056	1.225	-0.123	-0.091
63	4.474	1.491	1.081	1.244	-0.11	-0.079
64	4.509	1.509	1.1	1.26	-0.113	-0.079
65	4.509	1.522	1.122	1.273	-0.104	-0.069
66	4.509	1.531	1.135	1.282	-0.107	-0.072
67	4.566	1.54	1.151	1.292	-0.104	-0.069
68	4.509	1.543	1.157	1.295	-0.123	-0.085
69	4.509	1.556	1.173	1.305	-0.11	-0.072
70	4.572	1.562	1.182	1.311	-0.107	-0.069
71	4.572	1.565	1.188	1.317	-0.101	-0.063
72	4.591	1.571	1.195	1.32	-0.107	-0.069
73	4.594	1.577	1.204	1.327	-0.097	-0.06
74	5.732	1.633	1.211	1.349	-0.097	-0.056
75	7.94	2.148	1.267	1.689	-0.088	-0.047
76	8.611	2.414	1.406	1.911	-0.094	-0.05
77	8.983	2.593	1.57	2.066	-0.091	-0.047
78	9.319	2.725	1.728	2.187	-0.091	-0.041
79	9.555	2.83	1.866	2.282	-0.082	-0.028
80	9.76	2.92	1.961	2.368	-0.082	-0.028
81	9.933	2.987	2.012	2.431	-0.069	-0.012
82	10.078	3.046	2.027	2.488	-0.072	-0.012
83	10.191	3.105	2.034	2.539	-0.056	0.006
84	10.298	3.151	2.037	2.58	-0.053	0.012
85	10.364	3.191	2.04	2.619	-0.066	0.003
86	10.373	3.225	2.043	2.65	-0.053	0.015
87	10.446	3.253	2.043	2.676	-0.044	0.028
88	10.49	3.28	2.043	2.701	-0.037	0.037
89	10.528	3.302	2.043	2.723	-0.041	0.037

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
90	10.572	3.324	2.046	2.742	-0.037	0.044
91	10.613	3.342	2.043	2.758	-0.037	0.044
92	10.638	3.361	2.046	2.777	-0.041	0.05
93	10.65	3.376	2.068	2.796	-0.031	0.056
94	10.688	3.392	2.302	2.812	-0.022	0.069
95	10.713	3.404	2.302	2.825	-0.028	0.075
96	10.776	3.425	2.431	2.837	-0.028	0.075
97	10.817	3.441	2.428	2.853	-0.022	0.082
98	10.826	3.453	2.431	2.866	-0.028	0.082
99	10.852	3.462	2.425	2.876	-0.037	0.079
100	10.889	3.475	2.425	2.888	-0.028	0.094
101	10.911	3.487	2.421	2.898	-0.044	0.085
102	10.924	3.499	2.425	2.91	-0.022	0.104
103	10.937	3.512	2.431	2.923	-0.018	0.117
104	10.955	3.524	2.601	2.933	0	0.139
105	10.968	3.533	2.617	2.942	0.012	0.154
106	10.968	3.537	2.62	2.948	-0.006	0.145
107	10.99	3.54	2.623	2.952	-0.015	0.139
108	11.015	3.549	2.63	2.958	-0.028	0.136
109	11.015	3.558	2.636	2.964	-0.022	0.145
110	11.003	3.564	2.645	2.971	-0.015	0.154
111	11.015	3.567	2.652	2.977	-0.015	0.158
112	11.04	3.574	2.658	2.98	-0.018	0.164
113	11.075	3.58	2.664	2.993	-0.012	0.173
114	11.135	3.595	2.671	3.002	-0.012	0.183
115	11.116	3.601	2.677	3.009	-0.012	0.183
116	11.128	3.607	2.686	3.015	-0.009	0.192
117	11.163	3.614	2.689	3.021	-0.018	0.189
118	11.198	3.629	2.699	3.034	-0.018	0.189
119	11.229	3.635	2.708	3.04	-0.012	0.199
120	11.251	3.644	2.712	3.05	-0.018	0.199
121	11.251	3.651	2.718	3.053	-0.012	0.208
122	11.273	3.654	2.727	3.063	-0.006	0.218
123	11.273	3.66	2.727	3.063	-0.015	0.215
124	11.289	3.666	2.737	3.072	-0.018	0.215
125	11.308	3.672	2.743	3.075	-0.018	0.221
126	11.33	3.681	2.746	3.082	-0.006	0.234
127	11.358	3.681	2.749	3.085	-0.012	0.23
128	11.399	3.694	2.759	3.094	-0.028	0.224
129	11.449	3.7	2.759	3.101	-0.022	0.227
130	11.449	3.709	2.768	3.11	-0.022	0.23
131	11.402	3.703	2.775	3.11	-0.022	0.234
132	11.449	3.715	2.778	3.117	-0.006	0.249
133	11.462	3.722	2.787	3.12	0.003	0.262
134	11.443	3.728	2.787	3.126	-0.034	0.23

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
135	11.484	3.731	2.793	3.132	-0.009	0.256
136	11.455	3.734	2.793	3.132	-0.009	0.262
137	11.468	3.737	2.803	3.139	-0.012	0.262
138	11.481	3.743	2.806	3.142	-0.015	0.262
139	11.481	3.749	2.809	3.145	-0.012	0.268
140	11.512	3.743	2.806	3.145	-0.015	0.272
141	11.477	3.752	2.819	3.152	-0.009	0.275
142	11.506	3.752	2.816	3.155	-0.018	0.268
143	11.506	3.755	2.825	3.158	-0.003	0.287
144	11.493	3.762	2.828	3.161	-0.006	0.287
145	11.481	3.759	2.828	3.161	-0.003	0.291
146	11.506	3.759	2.831	3.161	0	0.3
147	8.983	3.537	2.828	3.053	-0.025	0.275
148	7.918	3.21	2.762	2.803	-0.009	0.294
149	7.638	3.058	2.658	2.663	-0.006	0.294
150	7.506	2.969	2.56	2.574	0.003	0.303
151	7.393	2.901	2.484	2.511	-0.003	0.297
152	7.348	2.849	2.418	2.46	-0.018	0.281
153	7.267	2.808	2.365	2.419	-0.009	0.287
154	7.289	2.781	2.327	2.39	0	0.294
155	7.289	2.765	2.298	2.374	0.003	0.294
156	7.26	2.75	2.27	2.355	-0.009	0.284
157	7.226	2.731	2.248	2.336	-0.003	0.284
158	7.229	2.719	2.229	2.323	0	0.287
159	7.222	2.707	2.22	2.314	0.012	0.297
160	7.204	2.691	2.201	2.301	-0.012	0.272
161	7.2	2.682	2.191	2.292	0.006	0.287
162	7.188	2.673	2.179	2.279	-0.003	0.278
163	7.159	2.663	2.175	2.276	0	0.278
164	7.159	2.663	2.166	2.269	0.006	0.278
165	7.156	2.657	2.16	2.266	0.009	0.284
166	7.159	2.648	2.147	2.257	-0.009	0.262
167	7.279	2.648	2.15	2.257	0.009	0.278
168	7.273	2.673	2.144	2.273	0.009	0.278
169	7.074	2.639	2.144	2.254	0.012	0.278
170	7.049	2.617	2.134	2.235	0.022	0.287
171	6.986	2.602	2.125	2.222	-0.003	0.265
172	7.015	2.599	2.119	2.216	0.015	0.275
173	7.002	2.593	2.109	2.209	0.015	0.281
174	6.977	2.583	2.1	2.203	0.012	0.268
175	6.986	2.577	2.097	2.196	0.022	0.281
176	6.977	2.577	2.094	2.196	0.022	0.278
177	6.967	2.574	2.087	2.193	0.031	0.284
178	6.989	2.571	2.081	2.19	0.015	0.272
179	6.952	2.568	2.078	2.184	0.012	0.265

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
180	6.996	2.565	2.078	2.184	0.015	0.265
181	6.977	2.562	2.078	2.187	0.028	0.275
182	6.964	2.562	2.078	2.187	0.022	0.272
183	6.961	2.559	2.075	2.181	0.025	0.272
184	6.97	2.556	2.065	2.177	0.015	0.265
185	6.996	2.559	2.068	2.177	0.012	0.259
186	6.986	2.556	2.068	2.181	0.022	0.268
187	6.964	2.546	2.062	2.171	0.031	0.275
188	6.97	2.552	2.068	2.177	0.034	0.281
189	6.964	2.549	2.065	2.171	0.025	0.268
190	6.933	2.543	2.062	2.171	0.025	0.272
191	6.98	2.546	2.059	2.168	0.028	0.272
192	6.989	2.543	2.059	2.168	0.034	0.275
193	6.945	2.543	2.059	2.171	0.022	0.259
194	6.958	2.54	2.056	2.165	0.041	0.278
195	6.961	2.537	2.056	2.165	0.012	0.253
196	6.986	2.534	2.049	2.162	0.012	0.249
197	6.952	2.54	2.056	2.165	0.025	0.265
198	6.97	2.534	2.053	2.165	0.028	0.265
199	6.98	2.54	2.056	2.165	0.037	0.281
200	6.967	2.534	2.053	2.162	0.015	0.256
201	6.98	2.537	2.056	2.168	0.031	0.268
202	4.178	2.284	2.046	2.057	0.022	0.262
203	2.225	1.691	1.844	1.616	0.022	0.259
204	1.723	1.38	1.567	1.336	0.034	0.265
205	1.503	1.198	1.359	1.162	0.018	0.243
206	1.354	1.065	1.217	1.038	0.015	0.237
207	1.278	0.975	1.113	0.949	0.025	0.237
208	1.196	0.901	1.028	0.873	0.022	0.224
209	1.133	0.843	0.961	0.812	0.031	0.234
210	1.079	0.793	0.908	0.762	0.041	0.23
211	1.026	0.744	0.857	0.714	0.022	0.208
212	0.982	0.7	0.81	0.676	0.015	0.192
213	0.941	0.667	0.769	0.638	0.012	0.177
214	0.906	0.639	0.744	0.612	0.041	0.199
215	0.871	0.611	0.712	0.587	0.041	0.192
216	0.84	0.586	0.684	0.558	0.031	0.18
217	0.811	0.562	0.659	0.536	0.028	0.167
218	0.786	0.54	0.637	0.517	0.034	0.164
219	0.764	0.518	0.615	0.495	0.034	0.161
220	0.738	0.497	0.592	0.476	0.041	0.161
221	0.72	0.478	0.57	0.457	0.025	0.139
222	0.701	0.463	0.555	0.441	0.028	0.136
223	0.685	0.447	0.536	0.425	0.022	0.126
224	0.666	0.432	0.523	0.416	0.031	0.123

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
225	0.653	0.423	0.507	0.403	0.037	0.129
226	0.634	0.41	0.495	0.39	0.028	0.11
227	0.618	0.395	0.479	0.377	0.028	0.107
228	0.609	0.389	0.473	0.368	0.047	0.12
229	0.596	0.376	0.463	0.358	0.034	0.101

Step Test at Well PW, NL Industries, Pedricktown, NJ

2 June 1999

Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
0	0.091	-0.092	-0.031	-0.076	-0.249	-0.253
1	0.094	-0.095	-0.022	-0.066	-0.259	-0.256
2	0.078	-0.098	-0.031	-0.073	-0.243	-0.246
3	-0.161	-0.083	-0.031	-0.057	-0.243	-0.249
4	1.676	0.277	-0.022	0.146	-0.246	-0.249
5	2.765	0.447	0.006	0.273	-0.237	-0.237
6	3.266	0.688	0.072	0.473	-0.224	-0.227
7	3.481	0.824	0.192	0.597	-0.233	-0.237
8	2.03	0.713	0.309	0.587	-0.243	-0.24
9	1.521	0.512	0.362	0.454	-0.249	-0.243
10	1.436	0.444	0.372	0.393	-0.246	-0.237
11	1.414	0.419	0.365	0.365	-0.23	-0.224
12	1.357	0.395	0.359	0.349	-0.218	-0.211
13	1.335	0.379	0.346	0.333	-0.224	-0.218
14	1.335	0.373	0.337	0.323	-0.23	-0.224
15	1.313	0.367	0.328	0.32	-0.218	-0.208
16	1.865	0.46	0.328	0.368	-0.224	-0.218
17	1.91	0.5	0.34	0.406	-0.227	-0.218
18	1.925	0.521	0.359	0.425	-0.221	-0.215
19	2.61	0.617	0.362	0.482	-0.221	-0.211
20	2.901	0.747	0.419	0.574	-0.218	-0.205
21	2.983	0.818	0.463	0.647	-0.214	-0.202
22	3.011	0.858	0.507	0.685	-0.202	-0.192
23	3.052	0.886	0.548	0.714	-0.214	-0.202
24	3.068	0.907	0.586	0.736	-0.208	-0.192
25	3.09	0.923	0.618	0.752	-0.221	-0.202
26	3.096	0.941	0.646	0.771	-0.214	-0.199
27	3.14	0.957	0.665	0.784	-0.208	-0.189
28	3.15	0.969	0.684	0.8	-0.208	-0.189
29	3.147	0.985	0.706	0.812	-0.195	-0.177
30	3.162	0.997	0.719	0.822	-0.18	-0.164
31	3.194	1.006	0.734	0.832	-0.202	-0.18
32	3.178	1.012	0.744	0.838	-0.186	-0.17
33	3.194	1.018	0.756	0.844	-0.183	-0.164
34	3.5	1.077	0.766	0.879	-0.183	-0.158
35	3.585	1.114	0.785	0.917	-0.183	-0.161
36	3.661	1.148	0.807	0.946	-0.176	-0.151
37	3.708	1.173	0.829	0.968	-0.183	-0.158
38	3.724	1.185	0.842	0.981	-0.18	-0.155
39	3.733	1.204	0.867	0.997	-0.164	-0.142
40	3.752	1.216	0.883	1.006	-0.164	-0.136
41	3.784	1.219	0.895	1.013	-0.164	-0.136
42	3.759	1.228	0.908	1.025	-0.173	-0.145
43	3.768	1.241	0.92	1.038	-0.161	-0.132
44	3.781	1.25	0.93	1.041	-0.164	-0.136

Step Test at Well PW, NL Industries, Pedricktown, NJ

2 June 1999

Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
45	3.812	1.256	0.939	1.047	-0.17	-0.139
46	3.803	1.262	0.946	1.057	-0.151	-0.123
47	3.781	1.269	0.955	1.06	-0.148	-0.12
48	3.822	1.272	0.961	1.063	-0.145	-0.117
49	3.774	1.265	0.965	1.063	-0.158	-0.126
50	3.793	1.269	0.971	1.066	-0.145	-0.12
51	3.774	1.272	0.974	1.07	-0.151	-0.12
52	3.771	1.278	0.984	1.076	-0.132	-0.101
53	3.771	1.284	0.984	1.076	-0.148	-0.117
54	3.793	1.287	0.99	1.082	-0.145	-0.113
55	3.803	1.29	0.99	1.086	-0.142	-0.107
56	3.79	1.29	0.993	1.086	-0.142	-0.11
57	3.796	1.293	0.999	1.089	-0.126	-0.094
58	3.818	1.296	1.002	1.092	-0.132	-0.101
59	3.8	1.299	1.006	1.095	-0.132	-0.101
60	4.355	1.389	1.012	1.149	-0.113	-0.079
61	4.427	1.441	1.034	1.197	-0.126	-0.091
62	4.478	1.469	1.056	1.225	-0.123	-0.091
63	4.474	1.491	1.081	1.244	-0.11	-0.079
64	4.509	1.509	1.1	1.26	-0.113	-0.079
65	4.509	1.522	1.122	1.273	-0.104	-0.069
66	4.509	1.531	1.135	1.282	-0.107	-0.072
67	4.566	1.54	1.151	1.292	-0.104	-0.069
68	4.509	1.543	1.157	1.295	-0.123	-0.085
69	4.509	1.556	1.173	1.305	-0.11	-0.072
70	4.572	1.582	1.182	1.311	-0.107	-0.069
71	4.572	1.565	1.188	1.317	-0.101	-0.063
72	4.591	1.571	1.195	1.32	-0.107	-0.069
73	4.594	1.577	1.204	1.327	-0.097	-0.06
74	5.732	1.633	1.211	1.349	-0.097	-0.056
75	7.94	2.148	1.267	1.689	-0.088	-0.047
76	8.611	2.414	1.406	1.911	-0.094	-0.05
77	8.983	2.593	1.57	2.066	-0.091	-0.047
78	9.319	2.725	1.728	2.187	-0.091	-0.041
79	9.555	2.83	1.866	2.282	-0.082	-0.028
80	9.76	2.92	1.961	2.368	-0.082	-0.028
81	9.933	2.987	2.012	2.431	-0.069	-0.012
82	10.078	3.046	2.027	2.488	-0.072	-0.012
83	10.191	3.105	2.034	2.539	-0.056	0.006
84	10.298	3.151	2.037	2.58	-0.053	0.012
85	10.364	3.191	2.04	2.619	-0.066	0.003
86	10.373	3.225	2.043	2.65	-0.053	0.015
87	10.446	3.253	2.043	2.676	-0.044	0.028
88	10.49	3.28	2.043	2.701	-0.037	0.037
89	10.528	3.302	2.043	2.723	-0.041	0.037

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
90	10.572	3.324	2.046	2.742	-0.037	0.044
91	10.613	3.342	2.043	2.758	-0.037	0.044
92	10.638	3.361	2.046	2.777	-0.041	0.05
93	10.65	3.376	2.068	2.796	-0.031	0.056
94	10.688	3.392	2.302	2.812	-0.022	0.069
95	10.713	3.404	2.302	2.825	-0.028	0.075
96	10.776	3.425	2.431	2.837	-0.028	0.075
97	10.817	3.441	2.428	2.853	-0.022	0.082
98	10.826	3.453	2.431	2.866	-0.028	0.082
99	10.852	3.462	2.425	2.876	-0.037	0.079
100	10.889	3.475	2.425	2.888	-0.028	0.094
101	10.911	3.487	2.421	2.898	-0.044	0.085
102	10.924	3.499	2.425	2.91	-0.022	0.104
103	10.937	3.512	2.431	2.923	-0.018	0.117
104	10.955	3.524	2.601	2.933	0	0.139
105	10.968	3.533	2.617	2.942	0.012	0.154
106	10.968	3.537	2.62	2.948	-0.006	0.145
107	10.99	3.54	2.623	2.952	-0.015	0.139
108	11.015	3.549	2.63	2.958	-0.028	0.136
109	11.015	3.558	2.636	2.964	-0.022	0.145
110	11.003	3.564	2.645	2.971	-0.015	0.154
111	11.015	3.567	2.652	2.977	-0.015	0.158
112	11.04	3.574	2.658	2.98	-0.018	0.164
113	11.075	3.58	2.664	2.993	-0.012	0.173
114	11.135	3.595	2.671	3.002	-0.012	0.183
115	11.116	3.601	2.677	3.009	-0.012	0.183
116	11.128	3.607	2.686	3.015	-0.009	0.192
117	11.163	3.614	2.689	3.021	-0.018	0.189
118	11.198	3.629	2.699	3.034	-0.018	0.189
119	11.229	3.635	2.708	3.04	-0.012	0.199
120	11.251	3.644	2.712	3.05	-0.018	0.199
121	11.251	3.651	2.718	3.053	-0.012	0.208
122	11.273	3.654	2.727	3.063	-0.006	0.218
123	11.273	3.66	2.727	3.063	-0.015	0.215
124	11.289	3.666	2.737	3.072	-0.018	0.215
125	11.308	3.672	2.743	3.075	-0.018	0.221
126	11.33	3.681	2.746	3.082	-0.006	0.234
127	11.358	3.681	2.749	3.085	-0.012	0.23
128	11.399	3.694	2.759	3.094	-0.028	0.224
129	11.449	3.7	2.759	3.101	-0.022	0.227
130	11.449	3.709	2.768	3.11	-0.022	0.23
131	11.402	3.703	2.775	3.11	-0.022	0.234
132	11.449	3.715	2.778	3.117	-0.006	0.249
133	11.462	3.722	2.787	3.12	0.003	0.262
134	11.443	3.728	2.787	3.126	-0.034	0.23

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
135	11.484	3.731	2.793	3.132	-0.009	0.256
136	11.455	3.734	2.793	3.132	-0.009	0.262
137	11.468	3.737	2.803	3.139	-0.012	0.262
138	11.481	3.743	2.806	3.142	-0.015	0.262
139	11.481	3.749	2.809	3.145	-0.012	0.268
140	11.512	3.743	2.806	3.145	-0.015	0.272
141	11.477	3.752	2.819	3.152	-0.009	0.275
142	11.506	3.752	2.816	3.155	-0.018	0.268
143	11.506	3.755	2.825	3.158	-0.003	0.287
144	11.493	3.762	2.828	3.161	-0.006	0.287
145	11.481	3.759	2.828	3.161	-0.003	0.291
146	11.506	3.759	2.831	3.161	0	0.3
147	8.983	3.537	2.828	3.053	-0.025	0.275
148	7.918	3.21	2.762	2.803	-0.009	0.294
149	7.638	3.058	2.658	2.663	-0.006	0.294
150	7.506	2.969	2.56	2.574	0.003	0.303
151	7.393	2.901	2.484	2.511	-0.003	0.297
152	7.348	2.849	2.418	2.46	-0.018	0.281
153	7.267	2.808	2.365	2.419	-0.009	0.287
154	7.289	2.781	2.327	2.39	0	0.294
155	7.289	2.765	2.298	2.374	0.003	0.294
156	7.26	2.75	2.27	2.355	-0.009	0.284
157	7.226	2.731	2.248	2.336	-0.003	0.284
158	7.229	2.719	2.229	2.323	0	0.287
159	7.222	2.707	2.22	2.314	0.012	0.297
160	7.204	2.691	2.201	2.301	-0.012	0.272
161	7.2	2.682	2.191	2.292	0.006	0.287
162	7.188	2.673	2.179	2.279	-0.003	0.278
163	7.159	2.663	2.175	2.276	0	0.278
164	7.159	2.663	2.166	2.269	0.006	0.278
165	7.156	2.657	2.16	2.266	0.009	0.284
166	7.159	2.648	2.147	2.257	-0.009	0.262
167	7.279	2.648	2.15	2.257	0.009	0.278
168	7.273	2.673	2.144	2.273	0.009	0.278
169	7.074	2.639	2.144	2.254	0.012	0.278
170	7.049	2.617	2.134	2.235	0.022	0.287
171	6.986	2.602	2.125	2.222	-0.003	0.265
172	7.015	2.599	2.119	2.216	0.015	0.275
173	7.002	2.593	2.109	2.209	0.015	0.281
174	6.977	2.583	2.1	2.203	0.012	0.268
175	6.986	2.577	2.097	2.196	0.022	0.281
176	6.977	2.577	2.094	2.196	0.022	0.278
177	6.967	2.574	2.087	2.193	0.031	0.284
178	6.989	2.571	2.081	2.19	0.015	0.272
179	6.952	2.568	2.078	2.184	0.012	0.265

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
180	6.996	2.565	2.078	2.184	0.015	0.265
181	6.977	2.562	2.078	2.187	0.028	0.275
182	6.964	2.562	2.078	2.187	0.022	0.272
183	6.961	2.559	2.075	2.181	0.025	0.272
184	6.97	2.556	2.065	2.177	0.015	0.265
185	6.996	2.559	2.068	2.177	0.012	0.259
186	6.986	2.556	2.068	2.181	0.022	0.268
187	6.964	2.546	2.062	2.171	0.031	0.275
188	6.97	2.552	2.068	2.177	0.034	0.281
189	6.964	2.549	2.065	2.171	0.025	0.268
190	6.933	2.543	2.062	2.171	0.025	0.272
191	6.98	2.546	2.059	2.168	0.028	0.272
192	6.989	2.543	2.059	2.168	0.034	0.275
193	6.945	2.543	2.059	2.171	0.022	0.259
194	6.958	2.54	2.056	2.165	0.041	0.278
195	6.961	2.537	2.056	2.165	0.012	0.253
196	6.986	2.534	2.049	2.162	0.012	0.249
197	6.952	2.54	2.056	2.165	0.025	0.265
198	6.97	2.534	2.053	2.165	0.028	0.265
199	6.98	2.54	2.056	2.165	0.037	0.281
200	6.967	2.534	2.053	2.162	0.015	0.256
201	6.98	2.537	2.056	2.168	0.031	0.268
202	4.178	2.284	2.046	2.057	0.022	0.262
203	2.225	1.691	1.844	1.616	0.022	0.259
204	1.723	1.38	1.567	1.336	0.034	0.265
205	1.503	1.198	1.359	1.162	0.018	0.243
206	1.354	1.065	1.217	1.038	0.015	0.237
207	1.278	0.975	1.113	0.949	0.025	0.237
208	1.196	0.901	1.028	0.873	0.022	0.224
209	1.133	0.843	0.961	0.812	0.031	0.234
210	1.079	0.793	0.908	0.762	0.041	0.23
211	1.026	0.744	0.857	0.714	0.022	0.208
212	0.982	0.7	0.81	0.676	0.015	0.192
213	0.941	0.667	0.769	0.638	0.012	0.177
214	0.906	0.639	0.744	0.612	0.041	0.199
215	0.871	0.611	0.712	0.587	0.041	0.192
216	0.84	0.586	0.684	0.558	0.031	0.18
217	0.811	0.562	0.659	0.536	0.028	0.167
218	0.786	0.54	0.637	0.517	0.034	0.164
219	0.764	0.518	0.615	0.495	0.034	0.161
220	0.738	0.497	0.592	0.476	0.041	0.161
221	0.72	0.478	0.57	0.457	0.025	0.139
222	0.701	0.463	0.555	0.441	0.028	0.136
223	0.685	0.447	0.536	0.425	0.022	0.126
224	0.666	0.432	0.523	0.416	0.031	0.123

Step Test at Well PW, NL Industries, Pedricktown, NJ						
2 June 1999						
Elapsed Time (min.)	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28
225	0.653	0.423	0.507	0.403	0.037	0.129
226	0.634	0.41	0.495	0.39	0.028	0.11
227	0.618	0.395	0.479	0.377	0.028	0.107
228	0.609	0.389	0.473	0.368	0.047	0.12
229	0.596	0.376	0.463	0.358	0.034	0.101

APPENDIX H

DATALOGGER TABLES

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

6/7/99 14:20

Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
Step 0									
0	0	1.982	0	0	-0.009	0.009	0.018	0.053	0.005
0.0083	0.0083	0.473	0	-0.003	-0.012	0.006	0.015	0.05	-0.005
0.0166	0.0166	0.489	0	-0.006	-0.009	0.006	0.018	-0.05	0.005
0.025	0.025	0.666	0.006	-0.009	-0.006	0.006	0.018	0.047	0
0.0333	0.0333	0.792	0.006	0	-0.009	0.003	0.015	0.05	-0.005
0.0416	0.0416	1.041	0.009	-0.003	-0.012	0.003	0.015	0.047	0.005
0.05	0.05	1.196	0.015	-0.006	-0.009	0.003	0.012	0.047	0
0.0583	0.0583	1.344	0.018	-0.006	-0.009	0	0.012	0.041	0
0.0666	0.0666	1.528	0.024	-0.006	-0.003	0	0.012	0.041	0.005
0.075	0.075	1.707	0.033	0	0.003	-0.003	0.009	0.037	0
0.0833	0.0833	1.812	0.04	-0.006	0.003	-0.003	0.006	0.041	0.005
0.0916	0.0916	1.998	0.049	-0.003	0	-0.006	0.006	0.034	-0.005
0.1	0.1	2.174	0.058	-0.006	0.003	-0.009	0.003	0.031	0.005
0.1083	0.1083	2.272	0.067	-0.012	0.006	-0.009	0.003	0.031	0.005
0.1166	0.1166	2.427	0.08	-0.009	0.009	-0.012	0.003	0.034	0
0.125	0.125	2.607	0.089	-0.012	0.009	-0.012	0	0.028	0
0.1333	0.1333	2.705	0.101	-0.006	0.015	-0.012	0	0.025	0
0.1416	0.1416	2.865	0.114	-0.012	0.019	-0.015	0	0.028	0
0.15	0.15	3.029	0.126	-0.009	0.022	-0.015	-0.003	0.028	0.005
0.1583	0.1583	3.115	0.138	-0.012	0.028	-0.018	-0.003	0.025	-0.005
0.1666	0.1666	3.263	0.154	-0.009	0.028	-0.022	-0.006	0.018	-0.005
0.175	0.175	3.417	0.163	-0.012	0.034	-0.022	-0.006	0.018	-0.005
0.1833	0.1833	3.471	0.179	-0.009	0.041	-0.022	-0.009	0.015	0
0.1916	0.1916	3.603	0.194	-0.006	0.047	-0.025	-0.009	0.022	0
0.2	0.2	3.726	0.209	-0.006	0.05	-0.025	-0.009	0.012	-0.005
0.2083	0.2083	3.783	0.225	-0.009	0.06	-0.028	-0.012	0.009	0
0.2166	0.2166	3.897	0.24	-0.006	0.066	-0.028	-0.012	0.015	0
0.225	0.225	4.023	0.253	-0.006	0.069	-0.028	-0.015	0.009	0
0.2333	0.2333	4.086	0.268	-0.006	0.079	-0.031	-0.015	0.009	-0.005
0.2416	0.2416	4.165	0.284	-0.009	0.085	-0.034	-0.015	0.009	0
0.25	0.25	4.3	0.296	-0.009	0.092	-0.034	-0.018	0.006	-0.005
0.2583	0.2583	4.408	0.311	-0.009	0.098	-0.034	-0.018	0.003	0.005
0.2666	0.2666	4.452	0.324	-0.009	0.104	-0.037	-0.018	0.003	0
0.275	0.275	4.562	0.336	-0.009	0.114	-0.037	0.018	0.006	0
0.2833	0.2833	4.622	0.345	-0.009	0.123	-0.041	-0.022	-0.003	-0.005
0.2916	0.2916	4.691	0.361	-0.003	0.13	-0.041	-0.022	0.003	0
0.3	0.3	4.798	0.376	-0.003	0.136	-0.044	-0.022	0	0.005
0.3083	0.3083	4.893	0.392	-0.009	0.142	-0.044	-0.025	0	0
0.3166	0.3166	4.928	0.401	-0.006	0.149	-0.047	-0.025	-0.003	0
0.325	0.325	5.044	0.419	-0.006	0.158	-0.047	-0.028	-0.003	0.005
0.3333	0.3333	5.139	0.432	-0.006	0.168	-0.047	0.028	-0.003	0
0.35	0.35	5.262	0.457	-0.003	0.184	-0.05	-0.031	-0.006	0
0.3666	0.3666	5.378	0.487	0	0.2	-0.053	-0.031	-0.009	0.005
0.3833	0.3833	5.574	0.515	0	0.212	-0.053	-0.034	0.012	0.005
0.4	0.4	5.671	0.54	-0.003	0.225	0.056	-0.037	0.015	0
0.4166	0.4166	5.804	0.568	0	0.244	-0.06	-0.037	0.012	0
0.4333	0.4333	5.971	0.595	0	0.26	-0.06	-0.044	-0.018	0
0.45	0.45	6.056	0.611	0	0.276	-0.06	-0.041	-0.022	0
0.4666	0.4666	6.182	0.642	0.009	0.298	0.063	-0.041	-0.018	0
0.4833	0.4833	6.327	0.67	0.012	0.311	0.063	-0.044	-0.022	0.005
0.5	0.5	6.402	0.694	0.012	0.323	0.063	0.044	0.025	0
0.5166	0.5166	6.516	0.719	0.018	0.339	-0.066	-0.047	-0.025	0.005
0.5333	0.5333	6.651	0.747	0.015	0.358	-0.066	-0.047	-0.022	0
0.55	0.55	6.717	0.771	0.028	0.374	-0.066	-0.047	-0.025	0.005
0.5666	0.5666	6.799	0.799	0.022	0.39	-0.069	-0.05	-0.025	0
0.5833	0.5833	6.935	0.821	0.034	0.403	-0.069	-0.05	-0.028	0
0.6	0.6	7.004	0.842	0.034	0.422	-0.069	-0.053	-0.031	0.005
0.6166	0.6166	7.048	0.867	0.031	0.438	-0.072	-0.053	-0.034	0

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
0.6333	0.6333	7.18	0.879	0.044	0.45	-0.072	-0.053	0.031	-0.005
0.65	0.65	7.231	0.904	0.047	0.469	-0.072	-0.053	0.034	-0.005
0.6666	0.6666	7.266	0.926	0.056	0.485	-0.072	-0.056	0.034	-0.005
0.6833	0.6833	7.369	0.95	0.056	0.501	-0.072	-0.056	-0.034	0.005
0.7	0.7	7.423	0.975	0.059	0.517	-0.072	-0.056	-0.037	-0.005
0.7166	0.7166	7.448	0.994	0.072	0.53	-0.075	-0.056	-0.034	0
0.7333	0.7333	7.536	1.015	0.078	0.549	-0.075	-0.06	-0.037	0.005
0.75	0.75	7.602	1.037	0.078	0.558	-0.075	-0.056	-0.037	0
0.7666	0.7666	7.615	1.055	0.085	0.574	-0.075	-0.056	-0.034	0
0.7833	0.7833	7.694	1.068	0.094	0.587	-0.075	-0.056	0.041	0.005
0.8	0.8	7.757	1.089	0.104	0.606	-0.075	-0.056	0.041	0.005
0.8166	0.8166	7.785	1.108	0.107	0.616	-0.072	-0.056	0.041	0
0.8333	0.8333	7.835	1.126	0.113	0.631	-0.072	-0.056	-0.044	-0.005
0.85	0.85	7.92	1.145	0.119	0.65	-0.072	-0.056	-0.041	0.01
0.8666	0.8666	7.943	1.163	0.135	0.66	-0.072	-0.056	-0.034	0
0.8833	0.8833	7.961	1.182	0.141	0.673	-0.072	-0.053	-0.034	0
0.9	0.9	8.05	1.197	0.148	0.689	-0.069	-0.056	-0.031	0
0.9166	0.9166	8.094	1.216	0.154	0.701	-0.069	-0.053	-0.028	0
0.9333	0.9333	8.078	1.231	0.16	0.714	-0.069	-0.053	-0.028	0
0.95	0.95	8.097	1.247	0.173	0.727	-0.066	-0.05	-0.031	0.005
0.9666	0.9666	8.1	1.259	0.179	0.743	-0.066	-0.053	-0.028	0
0.9833	0.9833	7.968	1.275	0.157	0.755	-0.066	-0.05	-0.022	0.01
1	1	7.949	1.287	0.164	0.765	-0.066	-0.05	-0.018	0.005
1.2	1.2	6.799	1.336	0.102	0.866	-0.034	-0.028	-0.006	0.005
1.4	1.4	6.481	1.321	0.41	0.895	-0.041	-0.025	0.003	0
1.6	1.6	7.338	1.429	0.488	0.962	-0.053	-0.037	-0.012	0
1.8	1.8	7.7	1.546	0.564	1.051	0.056	-0.037	-0.012	0.005
2	2	7.977	1.645	0.655	1.133	-0.06	-0.037	-0.009	0
2.2	2.2	8.342	1.741	0.728	1.212	-0.056	-0.034	-0.015	-0.005
2.4	2.4	8.582	1.83	0.81	1.289	0.053	-0.031	-0.009	0
2.6	2.6	8.786	1.913	0.876	1.358	0.05	-0.025	-0.009	0.005
2.8	2.8	8.981	1.991	0.933	1.428	-0.047	-0.022	-0.003	0.005
3	3	9.107	2.062	1.015	1.495	-0.037	-0.009	0.015	0.01
3.2	3.2	9.091	2.12	1.084	1.555	-0.012	0.015	0.037	0.01
3.4	3.4	9.189	2.176	1.144	1.606	0	0.034	0.056	0.005
3.6	3.6	9.321	2.225	1.204	1.657	0.015	0.047	0.085	0.005
3.8	3.8	9.249	2.268	1.248	1.701	0.018	0.053	0.107	0.01
4	4	9.236	2.302	1.299	1.739	0.025	0.06	0.123	0.005
4.2	4.2	9.154	2.321	1.346	1.771	0.031	0.069	0.135	0
4.4	4.4	9.057	2.318	[illegible]	1.784	0.037	0.079	0.135	0
4.6	4.6	8.852	2.299	1.415	1.793	0.034	0.079	0.145	0.01
4.8	4.8	8.638	2.278	1.438	1.79	0.018	0.069	0.142	0.005
5	5	8.415	2.262	1.453	1.784	0.009	0.063	0.138	0
5.2	5.2	8.257	2.244	1.463	1.781	0.009	0.063	0.135	0
5.4	5.4	8.138	2.231	1.472	1.774	0.018	0.072	0.132	0
5.6	5.6	7.911	2.213	1.479	1.768	0.022	0.079	0.129	0.005
5.8	5.8	7.735	2.185	1.479	1.755	0.022	0.082	0.129	0
6	6	7.599	2.163	1.485	1.746	0.015	0.079	0.132	0
6.2	6.2	7.499	2.139	1.482	1.733	0.012	0.075	0.129	0.005
6.4	6.4	7.417	2.123	1.479	1.723	0.003	0.069	0.113	0
6.6	6.6	7.357	2.111	1.479	1.711	-0.009	0.06	0.097	0
6.8	6.8	7.297	2.089	1.479	1.704	-0.018	0.053	0.097	0
7	7	7.24	2.083	1.479	1.695	-0.025	0.047	0.101	0.005
7.2	7.2	7.187	2.074	1.479	1.689	-0.028	0.047	0.119	0
7.4	7.4	7.14	2.068	1.475	1.685	-0.028	0.05	0.119	0.005
7.6	7.6	7.105	2.059	1.472	1.679	-0.025	0.056	0.129	0.005
7.8	7.8	7.064	2.046	1.475	1.669	-0.031	0.05	0.135	0.005
8	8	7.036	2.046	1.479	1.673	-0.025	0.056	0.135	0.005
8.2	8.2	7.001	2.046	1.479	1.673	-0.015	0.069	0.138	0.005

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999									
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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
8.4	8.4	6.973	2.031	1.472	1.669	-0.009	0.075	0.138	0
8.6	8.6	6.969	2.046	1.475	1.669	0.009	0.075	0.135	0.005
8.8	8.8	6.938	2.031	1.479	1.673	-0.009	0.079	0.126	0.005
9	9	6.903	2.043	1.479	1.673	0.006	0.085	0.132	0
9.2	9.2	6.888	2.046	1.475	1.669	-0.006	0.088	0.135	0.005
9.4	9.4	6.869	2.04	1.479	1.669	-0.009	0.085	0.145	0.005
9.6	9.6	6.878	2.046	1.475	1.673	-0.009	0.091	0.148	0
9.8	9.8	6.862	2.037	1.472	1.669	-0.022	0.082	0.116	0
10	10	6.837	2.031	1.472	1.666	0.06	0.047	0.091	0.005
12	12	6.799	2.028	1.472	1.669	-0.072	0.053	0.116	0.005
14	14	6.815	2.049	1.482	1.692	-0.018	0.123	0.22	0.005
16	16	6.74	2.068	1.482	1.711	-0.031	0.129	0.243	0.01
18	18	6.648	2.092	1.488	1.736	-0.037	0.142	0.255	0.005
20	20	6.639	2.105	1.482	1.752	0.104	0.091	0.233	0.01
22	22	6.61	2.123	1.472	1.768	0.11	0.094	0.205	0.015
24	24	6.588	2.151	1.488	1.8	-0.022	0.199	0.356	0.01
26	26	6.576	2.17	1.491	1.815	-0.031	0.205	0.366	0.01
28	28	6.585	2.182	1.488	1.828	-0.066	0.183	0.331	0.01
30	30	6.528	2.194	1.485	1.841	-0.082	0.177	0.293	0.015
32	32	6.469	2.207	1.488	1.857	-0.066	0.205	0.359	0.02
34	34	6.472	2.219	1.485	1.866	-0.079	0.205	0.35	0.025
36	36	6.465	2.228	1.485	1.876	-0.097	0.199	0.347	0.02
38	38	6.494	2.241	1.485	1.888	-0.085	0.218	0.362	0.03
40	40	6.497	2.256	1.482	1.898	-0.088	0.227	0.381	0.025
42	42	6.538	2.262	1.485	1.908	-0.082	0.237	0.388	0.025
44	44	6.525	2.268	1.482	1.917	-0.097	0.23	0.394	0.03
46	46	6.525	2.281	1.482	1.923	-0.104	0.23	0.375	0.03
48	48	6.576	2.29	1.485	1.936	-0.072	0.272	0.429	0.03
50	50	6.56	2.293	1.482	1.942	0.101	0.249	0.4	0.035
52	52	6.544	2.299	1.482	1.949	0.101	0.256	0.416	0.03
54	54	6.573	2.305	1.482	1.955	0.094	0.268	0.407	0.035
56	56	6.601	2.315	1.479	1.961	-0.101	0.268	0.441	0.035
58	58	6.623	2.321	1.479	1.971	0.104	0.268	0.429	0.04
60	60	6.639	2.324	1.472	1.971	0.161	0.224	0.362	0.04
62	62	6.62	2.336	1.482	1.987	0.082	0.303	0.467	0.04
64	64	6.617	2.342	1.485	1.993	0.082	0.306	0.47	0.035
66	66	6.648	2.345	1.482	1.996	-0.11	0.281	0.445	0.035
68	68	6.629	2.349	1.479	2	0.113	0.287	0.457	0.035
70	70	6.661	2.358	1.482	2.009	0.097	0.306	0.473	0.035
72	72	6.692	2.364	1.479	2.009	0.091	0.319	0.47	0.045
74	74	6.667	2.367	1.482	2.015	0.088	0.322	0.482	0.035
76	76	6.683	2.373	1.485	2.025	0.091	0.322	0.479	0.04
78	78	6.654	2.373	1.482	2.025	0.094	0.322	0.479	0.04
80	80	6.661	2.379	1.639	2.028	0.085	0.332	0.495	0.045
82	82	6.677	2.383	1.734	2.034	0.107	0.319	0.457	0.045
84	84	6.686	2.383	1.728	2.034	-0.088	0.341	0.508	0.045
86	86	6.689	2.389	1.731	2.041	-0.085	0.344	0.501	0.045
88	88	6.677	2.392	1.728	2.044	-0.094	0.338	0.511	0.05
90	90	6.683	2.395	1.728	2.047	-0.088	0.347	0.514	0.05
92	92	6.702	2.392	1.721	2.047	-0.101	0.335	0.498	0.055
94	94	6.717	2.398	1.721	2.053	-0.088	0.351	0.508	0.06
96	96	6.711	2.404	1.721	2.057	0.088	0.354	0.508	0.06
98	98	6.708	2.407	1.721	2.06	-0.094	0.354	0.514	0.065
100	100	6.724	2.401	1.718	2.06	-0.088	0.357	0.517	0.07
105	105	6.727	2.413	1.914	2.069	0.088	0.363	0.523	0.07
110	110	6.714	2.42	1.92	2.076	0.088	0.366	0.523	0.07
115	115	6.755	2.426	1.929	2.082	0.091	0.37	0.52	0.075
120	120	6.74	2.432	1.939	2.088	0.079	0.385	0.546	0.07
125	125	6.746	2.438	1.942	2.095	0.082	0.389	0.539	0.07

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999									
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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
130	130	7.316	2.54	1.98	2.171	0.085	0.392	0.555	0.07
135	135	6.906	2.518	2.03	2.174	0.11	0.373	0.542	0.075
140	140	6.727	2.457	1.974	2.117	0.091	0.398	0.571	0.075
145	145	6.976	2.512	2.002	2.161	0.066	0.411	0.568	0.075
150	150	6.995	2.524	2.015	2.171	0.075	0.423	0.58	0.075
155	155	7.001	2.528	2.024	2.177	0.082	0.433	0.593	0.08
160	160	7.02	2.537	[illegible]	2.187	0.148	0.43	0.596	0.08
165	165	7.029	2.54	2.037	2.19	0.123	0.414	0.577	0.08
170	170	7.01	2.543	2.04	2.193	0.123	0.423	0.599	0.09
175	175	7.01	2.543	2.04	2.196	0.129	0.427	0.583	0.09
180	180	[illegible]	2.549	2.046	2.199	0.135	0.439	0.602	0.095
185	185	7.017	2.552	2.049	2.206	0.139	0.446	0.612	0.1
190	190	7.045	2.552	2.052	2.206	0.132	0.442	0.612	0.1
195	195	7.017	2.558	2.056	2.212	0.139	0.455	0.618	0.111
200	200	7.036	2.558	2.059	2.215	0.116	0.433	0.599	0.121
205	205	7.061	2.565	2.068	2.218	0.142	0.458	0.628	0.116
210	210	7.051	2.565	2.071	2.222	0.132	0.452	0.618	0.116
215	215	7.029	2.561	2.062	2.215	0.129	0.455	0.621	0.116
220	220	7.048	2.565	2.068	2.222	0.132	0.458	0.621	0.116
225	225	7.048	2.571	2.078	2.231	0.129	0.458	0.624	0.116
230	230	7.048	2.577	2.084	2.238	0.135	0.468	0.631	0.121
235	235	7.064	2.571	2.078	2.231	0.139	0.468	0.643	0.121
240	240	7.054	2.571	2.075	2.222	0.132	0.468	0.634	0.126
245	245	7.061	2.577	2.081	2.238	0.129	0.468	0.637	0.136
250	250	7.095	2.583	2.093	2.244	0.129	0.471	0.64	0.131
255	255	7.095	2.583	2.093	2.244	0.129	0.474	0.64	0.141
260	260	7.095	2.589	2.097	2.247	0.132	0.477	0.647	0.141
265	265	7.099	2.589	2.1	2.25	0.132	0.477	0.647	0.146
270	270	7.105	2.592	2.103	2.25	0.132	0.48	0.65	0.156
275	275	7.105	2.592	2.103	2.253	0.132	0.483	0.653	0.156
280	280	7.117	2.598	2.106	2.257	0.135	0.487	0.656	0.161
285	285	7.108	2.602	2.109	2.26	0.129	0.487	0.656	0.166
290	290	7.111	2.602	2.112	2.26	0.135	0.49	0.659	0.171
295	295	7.099	2.605	2.112	2.26	0.214	0.487	0.662	0.186
300	300	7.117	2.602	2.112	2.263	0.211	0.487	0.659	0.191
305	305	7.199	2.62	2.122	2.276	0.214	0.49	0.659	0.191
310	310	7.19	2.623	2.128	2.279	0.218	0.496	0.662	0.186
315	315	7.184	2.626	2.134	2.282	0.221	0.499	0.665	0.186
320	320	7.184	2.629	2.141	2.288	0.221	0.502	0.672	0.186
325	325	7.193	2.636	2.144	2.288	0.214	0.502	0.678	0.201
330	330	7.221	2.632	2.147	2.288	0.218	0.506	0.678	0.191
335	335	7.303	2.651	2.15	2.301	0.221	0.512	0.681	0.186
340	340	7.36	2.688	2.188	2.345	0.221	0.512	0.681	0.186
345	345	7.347	2.691	2.194	2.349	0.224	0.518	0.688	0.186
350	350	7.347	2.688	2.191	2.342	0.221	0.518	0.691	0.191
355	355	7.341	2.685	2.191	2.339	0.218	0.518	0.694	0.196
360	360	7.341	2.688	2.191	2.342	0.221	0.521	0.694	0.196
365	365	7.341	2.688	2.194	2.345	0.224	0.525	0.697	0.196
370	370	7.366	2.691	2.194	2.349	0.224	0.525	0.7	0.201
375	375	7.382	2.694	2.197	2.352	0.224	0.528	0.7	0.196
380	380	7.373	2.697	2.201	2.352	0.23	0.534	0.703	0.191
385	385	7.369	2.7	2.204	2.358	0.227	0.534	0.707	0.191
390	390	7.366	2.703	2.207	2.358	0.233	0.537	0.71	0.186
395	395	7.369	2.703	2.21	2.361	0.233	0.54	0.713	0.191
400	400	7.373	2.706	[illegible]	2.364	0.237	0.544	0.716	0.186
405	405	7.376	2.706	2.213	2.364	0.233	0.544	0.716	0.191
410	410	7.373	2.706	2.216	2.364	0.24	0.55	0.725	0.191
415	415	7.398	2.706	2.213	2.368	0.233	0.547	0.725	0.191
420	420	7.379	2.706	2.213	2.364	0.233	0.547	0.722	0.191

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
425	425	7.373	2.71	2.22	2.368	0.237	0.547	0.729	0.191
430	430	7.385	2.713	2.22	2.371	0.24	0.553	0.725	0.186
435	435	7.398	2.713	2.22	2.371	0.24	0.553	0.729	0.186
440	440	7.401	2.716	2.223	2.374	0.24	0.553	0.725	0.186
445	445	7.417	2.719	2.226	2.37[illegible]	0.243	0.556	0.725	0.181
450	450	7.404	2.719	2.229	2.38	0.243	0.556	0.729	0.181
455	455	7.401	2.719	2.229	2.38	0.24	0.553	0.729	0.191
460	460	7.41	2.722	2.229	2.38	0.243	0.556	0.729	0.186
465	465	7.417	2.722	2.232	2.383	0.246	0.559	0.732	0.186
470	470	7.404	[illegible].725	2.232	2.383	0.246	0.556	0.725	0.191
475	475	7.407	2.725	2.235	2.383	0.246	0.559	0.735	0.191
480	480	7.414	2.725	2.232	2.383	0.243	0.556	0.732	0.201
485	485	7.398	2.722	2.232	2.383	0.24	0.556	0.732	0.206
490	490	7.417	2.725	2.235	2.383	0.24	0.559	0.732	0.206
495	495	7.417	2.728	2.238	2.387	0.243	0.563	0.735	0.206
500	500	7.429	2.726	2.238	2.39	0.237	0.559	0.735	0.206
505	505	7.417	2.728	2.238	2.39	0.237	0.559	0.735	0.211
510	510	7.42	2.728	2.238	2.39	0.237	0.559	0.735	0.21[illegible]
515	515	7.436	2.728	2.238	2.393	0.2[illegible]7	0.563	0.732	0.217
520	520	7.429	2.728	2.242	2.393	0.2[illegible]	0.[illegible]61	0.732	0.222
525	525	7.448	2.726	2.242	2.393	0.23	0.563	0.735	0.237
530	530	7.448	2.728	2.242	2.393	0.227	0.563	0.738	0.242
535	535	7.442	2.728	2.242	2.393	0.227	0.559	0.732	0.25[illegible]
540	540	7.432	2.728	2.242	2.393	0.224	0.559	0.735	0.252
545	545	7.432	2.731	2.245	2.393	0.224	0.566	0.735	0.247
550	550	7.442	2.734	2.245	2.39[illegible]	0.224	0.565	0.735	0.25[illegible]
555	555	7.451	2.737	2.251	2.3[illegible]	0.227	0.569	0.738	0.247
560	560	7.448	2.734	2.248	[illegible].396	0.221	0.566	0.735	0.262
565	565	7.442	2.734	2.248	2.396	0.221	0.566	0.735	0.26[illegible]
570	570	7.445	2.734	2.248	2.396	0.218	0.566	0.738	0.27[illegible]
575	575	7.458	2.737	2.248	2.396	0.214	0.566	[illegible]35	0.277
580	580	7.458	2.737	2.251	2.399	0.218	0.569	[illegible].735	0.272
585	585	7.458	2.737	2.254	2.399	0.221	0.572	0.738	0.272
590	590	7.448	2.737	2.251	2.399	0.221	0.575	0.741	0.277
595	595	7.439	2.74	2.254	2.403	0.221	0.575	0.741	0.277
600	600	7.448	2.74	2.254	2.403	0.221	0.576	0.744	0.277
605	605	7.454	2.737	2.254	2.403	0.224	0.582	0.744	0.277
610	610	7.486	2.75	2.261	2.409	0.249	0.582	0.746	0.28[illegible]
615	615	7.467	2.743	2.261	2.409	0.246	0.578	0.746	0.267
620	620	7.467	2.747	2.261	2.409	0.246	0.582	0.751	0.29[illegible]
625	625	7.439	2.743	2.261	2.406	0.243	0.578	0.746	0.297
630	630	7.458	2.743	2.261	2.409	0.243	0.58[illegible]	0.748	0.302
635	635	7.483	2.743	2.261	2.409	0.24	0.582	0.748	0.307
640	640	7.451	2.743	2.261	2.40[illegible]	0.24	0.582	0.748	0.312
645	645	7.464	2.743	2.261	2.409	0.237	0.582	0.746	0.312
650	650	7.489	2.747	2.264	2.412	[illegible]	0.588	0.751	0.312
655	655	7.48	2.747	2.264	2.412	0.24	0.588	0.751	0.312
660	660	7.458	2.75	2.264	2.415	0.24	0.591	0.751	0.307
665	665	7.458	2.747	2.267	2.412	0.24	0.591	0.751	0.312
670	670	7.464	2.75	2.267	2.415	0.24	0.591	0.754	0.312
675	675	7.464	2.75	2.267	2.415	0.237	0.588	0.754	0.31[illegible]
680	680	7.458	2.75	2.267	2.415	0.237	0.591	0.754	0.317
685	685	7.464	2.75	2.267	2.415	0.237	0.594	0.754	0.317
690	690	7.454	2.747	2.267	2.415	0.2[illegible]	0.594	0.757	0.323
695	695	7.467	2.747	2.267	2.415	0.233	0.594	0.754	0.326
700	700	7.461	2.747	2.267	2.415	0.23	0.591	0.757	0.336
705	705	7.464	2.747	2.267	2.415	0.23	0.591	0.754	0.333
710	710	7.464	2.75	2.267	2.415	0.23	0.5[illegible]	0.754	0.333
715	715	7.461	2.75	2.27	2.418	0.233	0.59[illegible]	0.76	0.338

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
720	720	[illegible]	2.75	2.27	2.418	0.23	0.597	0.757	0.338
725	725	7.4[illegible]	2.75	2.27	2.418	0.23	0.597	0.757	0.343
730	730	7.48	2.753	2.267	2.422	0.23	0.6	0.76	0.343
735	735	7.461	2.756	2.276	2.425	0.256	0.604	0.76	0.343
740	740	7.495	2.756	2.276	2.425	0.252	0.604	0.766	0.348
745	745	7.47	2.756	2.276	2.425	0.252	0.604	0.76	0.353
750	750	7.464	2.756	2.276	2.425	0.256	0.604	0.766	0.353
755	755	7.489	2.759	2.279	2.428	0.256	0.607	0.766	0.353
760	760	7.495	2.759	2.279	2.431	0.256	0.607	0.766	0.353
765	765	7.492	2.762	2.283	2.431	0.256	0.61	0.763	0.353
770	770	7.499	2.765	2.2[illegible]	2.434	0.252	0.61	0.77	0.353
775	775	7.508	2.762	2.283	2.434	0.249	0.61	0.763	0.353
780	780	7.499	2.762	2.286	2.434	0.252	0.61	0.766	0.353
785	785	7.511	2.762	2.283	2.434	0.252	0.61	0.77	0.35[illegible]
790	790	7.502	2.762	2.283	2.434	0.252	0.613	0.766	0.356
795	795	7.505	2.765	2.286	2.434	0.252	0.613	0.766	0.356
800	800	7.52[illegible]	2.768	2.289	2.437	0.256	0.616	0.776	0.363
805	805	7.502	2.768	2.289	2.441	0.256	0.616	0.77	0.358
810	810	7.524	2.768	2.289	2.441	0.252	0.616	0.77	0.363
815	815	7.511	2.771	2.292	2.444	0.252	0.616	0.776	0.363
820	820	7.521	2.768	2.292	2.441	0.252	0.619	0.776	0.368
825	825	7.527	2.768	2.292	2.441	0.252	0.619	0.776	0.373
830	830	7.533	2.768	2.292	2.444	0.249	0.619	0.77[illegible]	0.373
835	835	7.505	2.768	2.289	2.441	0.252	0.619	0.773	0.373
840	840	7.53	2.771	2.295	2.447	0.252	0.619	0.773	0.368
845	845	7.508	2.771	2.295	2.447	0.259	0.626	0.779	0.373
850	850	7.533	2.774	2.295	2.45	0.256	0.626	0.779	0.373
855	855	7.543	2.774	2.298	2.45	0.256	0.626	0.78[illegible]	0.373
860	860	7.499	2.774	2.298	2.45	0.256	0.626	0.782	0.373
865	865	7.524	2.774	2.298	2.45	0.256	0.626	0.779	0.373
870	870	7.517	2.777	2.298	2.453	0.256	0.629	0.785	0.368
875	875	7.527	2.777	2.302	2.453	0.281	0.667	0.785	0.368
880	880	7.555	2.781	2.302	2.456	0.281	0.635	0.782	0.368
885	885	7.555	2.781	2.302	2.456	0.278	0.635	0.785	0.366
890	890	7.543	2.781	2.305	2.456	0.284	0.638	0.789	0.363
895	895	7.536	2.784	2.305	2.46	0.281	0.638	0.785	0.363
900	900	7.555	2.784	2.305	2.456	0.281	0.638	0.792	0.363
905	905	7.517	2.784	2.305	2.46	0.281	0.638	0.789	0.363
910	910	7.552	2.784	2.305	2.46	0.284	0.642	0.79[illegible]	0.363
915	915	7.565	2.784	2.305	2.46	0.284	0.642	0.789	0.356
920	920	7.539	2.787	2.30[illegible]	2.463	0.284	0.642	0.795	0.358
925	925	7.543	2.787	2.308	2.463	0.287	0.648	0.801	0.358
930	930	7.568	2.79	2.311	2.469	0.287	0.648	0.798	0.358
935	935	7.565	2.793	2.314	2.469	0.287	0.645	0.795	0.358
940	940	7.584	2.793	2.314	2.469	0.287	0.645	0.798	0.358
945	945	7.568	2.793	2.314	2.469	0.29	0.648	0.801	0.353
950	950	7.60[illegible]	2.796	2.314	2.469	0.287	0.646	0.804	0.358
955	955	7.593	2.796	2.314	2.472	0.29	0.651	0.801	0.353
960	960	7.596	2.796	2.317	2.475	0.29	0.651	0.804	0.348
965	965	7.609	2.799	2.317	2.475	0.29	0.651	0.804	0.348
970	970	7.612	2.7[illegible]9	2.32	2.479	0.293	0.654	0.804	0.343
975	975	7.596	2.80[illegible]	2.32	2.479	0.293	0.657	0.804	0.338
980	980	7.587	2.805	2.324	2.482	0.297	0.657	0.808	0.338
985	985	7.606	2.805	2.324	2.48[illegible]	0.297	0.661	0.8[illegible]	0.333
990	990	7.587	2.802	2.324	2.482	0.297	0.657	0.8[illegible]	0.328
995	995	7.593	[illegible].805	2.327	2.482	0.297	0.661	0.808	0.323
1000	1000	7.59	2.805	2.327	2.485	0.297	0.661	0.811	0.323
1005	1005	7.612	2.808	2.327	2.482	0.293	0.661	0.814	0.317
1010	1010	7.584	2.808	2.33	2.488	0.297	0.661	0.811	0.312

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1015	1015	7.615	2.808	2.33	2.488	0.3	0.664	0.811	0.307
1020	1020	7.602	2.808	2.33	2.488	0.3	0.664	0.811	0.302
1025	1025	7.615	2.808	2.33	2.488	0.284	0.651	0.801	[illegible]302
1030	1030	7.606	2.811	2.336	2.491	0.303	0.667	0.814	0.302
1035	1035	7.602	2.811	2.333	2.495	0.3	0.667	0.814	0.297
1040	1040	7.602	2.811	2.336	2.495	0.303	0.67	0.814	0.287
1045	1045	7.621	2.814	2.339	2.498	0.303	0.67	0.814	0.282
1050	1050	7.599	2.814	2.339	2.498	0.303	0.67	0.817	0.28[illegible]
1055	1055	7.634	2.814	2.339	2.501	0.306	0.676	0.817	0.28[illegible]
1060	1060	7.609	2.818	2.343	2.501	0.309	0.676	0.817	0.272
1065	1065	7.647	2.821	2.343	2.504	0.303	0.673	0.817	0.262
1070	1070	7.628	2.821	2.346	2.507	0.309	0.676	0.817	0.257
1075	1075	7.615	2.824	2.346	2.507	0.341	0.683	0.82	0.257
1080	1080	7.631	2.824	2.346	2.507	0.338	0.68	0.82	0.252
1085	1085	7.65	2.824	2.349	2.51	0.338	0.676	0.817	0.252
1090	1090	7.621	2.827	2.349	2.51	0.344	0.683	[illegible]	0.252
1095	1095	7.631	2.8[illegible]4	2.349	2.51	0.338	0.68	0.823	0.247
1100	1100	7.615	2.824	2.349	2.51	0.341	0.68	0.82	0.242
1105	1105	7.628	2.824	2.349	2.51	0.341	0.683	0.823	0.237
1110	1110	7.615	2.833	2.349	2.51	0.347	0.689	0.826	0.237
1115	1115	7.64	2.827	2.352	2.514	0.347	0.689	0.826	0.232
1120	1120	7.64	2.824	2.352	2.514	0.336	0.68	0.83	0.237
1125	1125	7.634	2.827	2.355	2.517	0.344	0.686	0.823	0.232
1130	1130	7.618	2.827	2.352	2.514	0.341	0.683	0.826	0.232
1135	1135	7.628	2.827	2.355	2.517	0.347	0.689	0.826	0.237
1140	1140	7.624	2.836	2.352	2.517	0.335	0.68	0.826	0.232
1145	1145	7.659	2.83	2.355	2.52	0.354	0.699	0.836	0.237
1150	1150	7.643	2.827	2.352	2.517	0.338	0.683	0.826	0.237
1155	1155	7.643	2.83	2.355	2.52	0.341	0.666	0.83	0.237
1160	1160	7.656	2.827	2.355	2.52	0.331	0.68	0.833	0.237
1165	1165	7.637	2.833	2.355	2.523	0.341	0.689	0.823	0.237
1170	1170	7.64	2.83	2.355	2.523	0.335	0.681	0.817	0.237
1175	1175	7.65	2.83	2.355	2.523	0.338	0.689	0.826	0.237
1180	1180	7.624	2.833	2.358	2.526	0.338	0.689	0.83	0.237
1185	1185	7.653	2.833	2.358	2.526	0.328	0.683	0.839	0.237
1190	1190	7.656	2.833	2.358	2.526	0.335	0.692	0.826	0.237
1195	1195	7.653	2.833	2.358	2.526	0.325	0.686	0.83	0.237
1200	1200	7.637	2.833	2.358	2.526	0.335	0.689	0.826	0.237
1205	1205	7.634	2.833	2.358	2.529	0.325	0.686	0.823	0.237
1210	1210	7.656	2.836	2.361	2.529	0.341	0.699	0.842	0.242
1215	1215	7.64	2.836	2.365	2.529	0.312	0.676	0.826	0.237
1220	1220	7.669	2.836	2.361	2.529	0.325	0.689	0.817	0.237
1225	1225	7.662	2.836	2.365	2.533	0.328	0.695	0.836	0.237
1230	1230	7.665	2.839	2.365	2.536	0.331	0.695	0.817	0.232
1235	1235	7.546	2.811	2.355	2.51	0.338	0.702	0.823	0.232
1240	1240	7.675	2.833	2.358	2.526	0.335	0.702	0.826	0.232
1245	1245	7.662	2.842	2.358	2.533	0.325	0.695	0.836	0.237
1250	1250	7.691	2.845	2.371	2.545	0.328	0.699	0.839	0.237
1255	1255	7.662	2.836	2.371	2.539	0.316	0.689	0.845	0.242
1260	1260	7.7	2.848	2.377	2.552	0.328	0.699	0.82	0.242
1265	1265	7.684	2.851	2.38	2.552	0.372	0.711	0.836	0.247
1270	1270	7.684	2.845	2.377	2.548	0.376	0.721	0.814	0.247
1275	1275	7.681	2.845	2.374	2.545	0.35	0.695	0.826	0.252
1280	1280	7.684	2.845	2.377	2.548	0.36	0.711	0.836	0.252
1285	1285	7.691	2.848	2.377	2.548	0.357	0.702	0.83	0.252
1290	1290	7.706	2.845	2.374	2.548	0.347	0.699	0.83	0.262
1295	1295	7.669	2.845	2.371	2.545	0.35	0.702	0.833	0.262
1300	1300	7.684	2.845	2.374	2.548	0.354	0.705	0.817	0.262
1305	1305	7.71	2.848	2.374	2.552	0.347	0.705	0.839	0.262

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1310	1310	7.71	2.845	2.37[illegible]	2.548	0.338	0.699	0.839	0.272
1315	1315	7.697	2.845	2.374	2.548	0.338	0.699	0.814	0.277
1320	1320	7.694	2.842	2.371	2.545	0.322	0.686	0.82	0.282
1325	1325	7.697	2.842	2.38	2.548	0.331	0.699	0.83	0.287
1330	1330	7.681	2.842	2.38	[illegible].545	0.328	0.692	0.811	0.292
1335	1335	7.713	2.845	2.384	2.548	0.335	0.702	0.826	0.29[illegible]
1340	1340	7.713	2.842	2.38	2.548	0.316	0.689	0.823	0.297
1345	1345	7.694	2.845	2.384	2.548	0.312	0.686	0.826	0.302
1350	1350	7.694	2.848	2.387	2.55[illegible]	0.344	0.718	0.836	0.307
1355	1355	7.719	2.848	2.387	2.552	0.316	0.695	0.798	0.312
1360	1360	7.71	2.848	2.38	2.552	0.316	0.699	0.833	0.307
1365	1365	7.694	2.84[illegible]	2.38	2.552	0.306	0.686	0.826	0.312
1370	1370	7.71	2.851	2.38	2.555	0.325	0.711	0.861	0.328
1375	1375	7.7[illegible]	2.842	2.377	2.545	0.325	0.657	0.801	0.328
1380	1380	7.71	2.851	2.387	2.558	0.376	0.708	0.833	0.323
1385	1385	7.732	2.851	2.39	2.561	0.363	0.699	0.826	0.323
1390	1390	7.738	2.858	2.39	2.564	0.382	0.721	0.842	0.323
1395	1395	7.719	2.858	2.39	2.561	0.376	0.718	0.845	0.323
1400	1400	7.71	2.851	2.387	2.561	0.363	0.708	0.808	0.333
1405	1405	7.722	2.851	2.384	2.558	0.354	0.699	0.83	0.333
1410	1410	7.735	2.851	2.384	2.561	0.36	0.708	0.836	0.343
1415	1415	7.741	2.855	2.387	2.564	0.363	0.711	0.845	0.338
1420	1420	7.725	2.858	2.39	2.564	0.36	0.711	0.849	0.343
1425	1425	7.732	2.855	2.387	2.564	0.366	0.718	0.852	0.343
1430	1430	7.728	2.858	2.39	2.568	0.369	0.724	0.839	0.348
1435	1435	7.735	2.858	2.387	2.568	0.344	0.702	0.814	0.353
1440	1440	7.732	2.858	2.384	2.564	0.335	0.699	0.839	0.353
1445	1445	7.719	2.858	2.387	2.568	0.354	0.711	0.845	0.353
1450	1450	7.744	2.861	2.393	2.574	0.35	0.714	0.842	0.353
1455	1455	7.716	2.855	2.374	2.561	0.274	0.645	0.716	0.363
1460	1460	7.722	2.864	2.396	2.577	0.372	0.737	0.864	0.363
1465	1465	7.735	2.867	2.39[illegible]	2.577	0.354	0.721	0.852	0.363
1470	1470	7.738	2.858	2.384	2.568	0.309	0.686	0.808	0.368
Step 1									
0	1470.001	6.251	2.743	2.387	2.498	0.376	0.749	0.867	0.368
0.0083	1470.0083	6.188	2.74	2.39	2.498	0.376	0.749	0.874	0.368
0.0166	1470.0166	6.128	2.734	2.387	2.495	0.376	0.749	0.867	0.373
0.025	1470.025	6.069	2.731	2.387	2.491	0.376	0.749	0.871	0.366
0.0333	1470.0333	6.005	2.725	2.384	2.488	0.376	0.749	0.871	0.373
0.0416	1470.0416	5.946	2.719	2.384	2.488	0.376	0.749	0.874	0.373
0.05	1470.05	5.886	2.713	2.384	2.482	0.376	0.749	0.874	0.373
0.0583	1470.0583	5.826	2.71	2.384	2.479	0.376	0.749	0.877	0.373
0.0666	1470.0666	5.763	2.703	2.384	2.475	0.376	0.749	0.877	0.373
0.075	1470.075	5.703	2.697	2.384	2.472	0.376	0.749	0.86	0.373
0.0833	1470.0833	5.643	2.694	2.384	2.466	0.376	0.749	0.88	0.368
0.0916	1470.0916	5.586	2.685	2.38	2.466	0.376	0.749	0.877	0.373
0.1	1470.1	5.527	2.682	2.39	2.463	0.376	0.749	0.877	0.366
0.1083	1470.1083	5.473	2.676	2.387	2.456	0.376	0.749	0.877	0.373
0.1166	1470.1166	5.416	2.669	2.384	2.453	0.376	0.752	0.874	0.366
0.125	1470.125	5.363	2.663	2.384	2.45	0.376	0.749	0.874	0.368
0.1333	1470.1333	5.312	2.657	2.384	2.447	0.376	0.752	0.88	0.373
0.1416	1470.1416	5.262	2.651	2.38	2.444	0.376	0.752	0.88	0.373
0.15	1470.15	5.215	2.645	2.384	2.441	0.376	0.752	0.88	0.373
0.1583	1470.1583	5.17	2.639	2.384	2.434	0.379	0.749	0.883	0.368
0.1666	1470.1666	5.126	2.632	2.387	2.431	0.376	0.749	0.883	0.373
0.175	1470.175	5.082	2.629	2.384	2.428	0.379	0.749	0.88	0.373
0.1833	1470.1833	5.041	2.623	2.38	2.425	0.376	0.752	0.883	0.373
0.1916	1470.1916	5	2.617	2.384	2.418	0.376	0.752	0.88	0.373
0.2	1470.2	4.962	2.611	2.38	2.415	0.376	0.749	0.886	0.373

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
0.2083	1470.2083	4.921	2.605	2.38	2.412	0.376	0.752	0.88	0.373
0.2166	1470.2166	4.884	2.598	2.38	2.409	0.379	0.752	0.88	0.373
0.225	1470.225	4.846	2.592	2.384	2.403	0.376	0.752	0.883	0.373
0.2333	1470.2333	4.808	2.589	2.377	2.399	0.375	0.752	0.886	0.373
0.2416	1470.2416	4.767	2.583	2.38	2.396	0.379	0.752	0.886	0.373
0.25	1470.25	4.729	2.577	2.377	2.393	0.379	0.752	0.883	0.373
0.2583	1470.2583	4.691	2.571	2.38	2.387	0.376	0.752	0.886	0.373
0.2666	1470.2666	4.653	2.565	2.377	2.38	0.379	0.752	0.883	0.368
0.275	1470.275	4.619	2.558	2.38	2.38	0.379	0.752	0.886	0.378
0.2833	1470.2833	4.584	2.555	2.38	2.374	0.376	0.752	0.886	0.373
0.2916	1470.2916	4.549	2.546	2.377	2.371	0.376	0.749	0.88	0.373
0.3	1470.3	4.518	2.543	2.374	2.368	0.376	0.752	0.883	0.373
0.3083	1470.3083	4.486	2.537	2.374	2.364	0.379	0.752	0.883	0.368
0.3166	1470.3166	4.458	2.531	2.371	2.358	0.376	0.752	0.893	0.368
0.325	1470.325	4.43	2.528	2.374	2.355	0.376	0.752	0.893	0.366
0.3333	1470.3333	4.401	2.521	2.374	2.352	0.376	0.752	0.883	0.373
0.35	1470.35	4.348	2.509	2.368	2.342	0.376	0.749	0.893	0.378
0.3666	1470.3666	4.3	2.5	2.365	2.333	0.376	0.749	0.893	0.378
0.3833	1470.3833	4.253	2.491	2.371	2.326	0.376	0.749	0.89	0.373
0.4	1470.4	4.209	2.478	2.365	2.32	0.376	0.746	0.89	0.373
0.4166	1470.4166	4.168	2.469	2.358	2.311	0.376	0.746	0.893	0.378
0.4333	1470.4333	4.127	2.46	2.361	2.301	0.372	0.746	0.893	0.373
0.45	1470.45	4.089	2.45	2.352	2.295	0.372	0.746	0.89	0.378
0.4666	1470.4666	4.054	2.441	2.355	2.288	0.372	0.746	0.89	0.378
0.4833	1470.4833	4.017	2.429	2.352	2.279	0.37[illegible]	0.746	0.89	0.373
0.5	1470.5	3.979	2.42	2.349	2.276	0.369	0.746	0.89	0.378
0.5166	1470.5166	3.941	2.413	2.343	2.266	0.369	0.743	0.893	0.371
0.5333	1470.5333	3.9	2.404	2.346	2.257	0.369	0.743	[illegible]	0.373
0.55	1470.55	3.859	2.395	2.339	2.25	0.369	0.743	0.893	[illegible]
0.5666	1470.5666	3.818	2.386	2.336	2.244	0.366	0.74	0.89	0.373
0.5833	1470.5833	3.771	2.376	2.333	2.234	0.366	0.74	0.896	0.378
0.6	1470.6	3.726	2.367	2.33	2.231	0.366	0.74	0.899	0.373
0.6166	1470.6166	3.682	2.358	2.327	2.222	0.366	0.74	0.896	0.373
0.6333	1470.6333	3.638	2.349	2.327	2.212	0.366	0.74	0.899	0.368
0.65	1470.65	3.597	2.339	2.32	2.266	0.366	0.737	0.893	0.378
0.6666	1470.6666	3.559	2.33	2.314	2.199	0.363	0.737	0.893	0.378
0.6833	1470.6833	3.525	2.321	2.314	2.193	0.363	0.737	0.893	0.376
0.7	1470.7	3.493	2.315	2.311	2.184	0.366	0.737	0.893	0.378
0.7166	1470.7166	3.462	2.305	2.311	2.18	0.363	0.737	0.893	0.373
0.7333	1470.7333	3.436	2.296	2.302	2.171	0.363	0.737	0.896	0.368
0.75	1470.75	3.411	2.29	2.302	2.165	0.363	0.737	0.899	0.373
0.7666	1470.7666	3.392	2.281	2.298	2.158	0.363	0.737	0.896	0.373
0.7833	1470.7833	3.37	2.275	2.289	2.152	0.363	0.733	0.893	0.366
0.8	1470.8	3.348	2.268	2.286	2.146	0.36	0.733	0.896	0.373
0.8166	1470.8166	3.332	2.259	2.279	2.139	0.36	0.733	0.893	0.373
0.8333	1470.8333	3.313	2.25	2.279	2.133	0.36	0.733	0.896	0.371
0.85	1470.85	3.294	2.244	2.273	2.126	0.36	0.733	0.89	0.378
0.8666	1470.8666	3.275	2.237	2.27	2.12	0.36	0.73	0.896	0.373
0.8833	1470.8833	3.26	2.231	2.264	2.114	0.36	0.73	0.896	0.373
0.9	1470.9	3.241	2.225	2.257	2.107	0.357	0.73	0.886	0.373
0.9166	1470.9166	3.222	2.216	2.254	2.101	0.357	0.73	0.896	0.373
0.9333	1470.9333	3.206	2.21	2.251	2.095	0.357	0.73	0.89	0.369
0.95	1470.95	3.187	2.207	2.245	2.088	0.357	0.727	0.89	0.368
0.9666	1470.9666	3.168	2.197	2.238	2.085	0.357	0.73	0.896	0.373
0.9833	1470.9833	3.152	2.191	2.238	2.079	0.354	0.727	0.886	0.376
1	1471	3.134	2.185	2.235	2.073	0.357	0.73	0.886	0.373
1.2	1471.2	2.865	2.111	2.172	2.006	0.357	0.73	0.877	0.373
1.4	1471.4	2.525	2.031	2.109	1.936	0.357	0.727	0.874	0.378
1.6	1471.6	2.307	1.969	2.052	1.873	0.344	0.711	0.861	0.373

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1.8	1471.8	2.174	1.901	2.005	1.819	0.338	0.708	0.861	0.373
2	1472	2.073	1.849	1.952	1.768	0.344	0.711	0.861	0.373
2.2	1472.2	2.001	1.799	1.904	1.723	0.35	0.718	0.867	0.373
2.4	1472.4	1.944	1.756	1.86	1.682	0.354	0.721	0.855	0.373
2.6	1472.6	1.897	1.719	1.813	1.644	0.347	0.714	0.849	0.378
2.8	1472.8	1.853	1.682	1.775	1.606	0.335	0.702	0.839	0.378
3	1473	1.818	1.682	1.743	1.577	0.328	0.692	0.845	0.376
3.2	1473.2	1.783	1.623	1.709	1.549	0.335	0.699	0.849	0.373
3.4	1473.4	1.758	1.593	1.68	1.52	0.335	0.699	0.845	0.373
3.6	1473.6	1.733	1.568	1.649	1.495	0.341	0.699	0.845	0.378
3.8	1473.8	1.711	1.546	1.624	1.47	0.347	0.702	0.845	0.373
4	1474	1.692	1.525	1.60[illegible]	1.447	0.341	0.699	0.842	0.378
4.2	1474.2	1.676	1.503	1.576	1.428	0.344	0.702	0.845	0.378
4.4	1474.4	1.66	1.485	1.561	1.406	0.347	0.705	0.852	0.373
4.6	1474.6	1.644	1.466	1.532	1.387	0.354	0.705	0.855	0.376
4.8	1474.8	1.629	1.451	1.538	1.371	0.354	0.705	0.845	0.373
5	1475	1.613	1.432	1.523	1.352	0.344	0.695	0.836	0.373
5.2	1475.2	1.594	1.414	1.501	1.336	0.344	0.695	0.836	0.378
5.4	1475.4	1.581	1.401	1.479	1.324	0.347	0.695	0.839	0.376
5.6	1475.6	1.569	1.389	1.463	1.311	0.347	0.689	0.839	0.378
5.8	1475.8	1.556	1.373	1.444	1.295	0.347	0.689	0.839	0.383
6	1476	1.543	1.361	1.425	1.282	0.344	0.689	0.842	0.378
6.2	1476.2	1.528	1.349	1.409	1.27	0.335	0.68	0.839	0.378
6.4	1476.4	1.515	1.336	1.397	1.257	0.331	0.676	0.836	0.378
6.6	1476.6	1.505	1.324	1.381	1.244	0.325	0.667	0.833	0.376
6.8	1476.8	1.493	1.315	1.3[illegible]	1.235	0.335	0.676	0.823	0.376
7	1477	1.483	1.305	1.362	1.225	0.335	0.673	0.811	0.378
7.2	1477.2	1.474	1.293	1.349	1.212	0.338	0.676	0.804	0.378
7.4	1477.4	1.464	1.284	1.337	1.203	0.338	0.676	0.801	0.376
7.6	1477.6	1.452	1.275	1.327	1.197	0.341	0.676	0.801	0.378
7.8	1477.8	1.442	1.26[illegible]	1.305	1.187	0.338	0.67	0.798	0.378
8	1478	1.433	1.256	1.308	1.174	0.338	0.67	0.795	0.383
8.2	1478.2	1.423	1.25	1.308	1.168	0.344	0.673	0.798	0.388
8.4	1478.4	1.414	1.241	1.305	1.162	0.347	0.67	0.801	0.373
8.6	1478.6	1.404	1.228	1.302	1.155	0.347	0.67	0.795	0.373
8.8	1478.8	1.398	1.225	1.289	1.146	0.344	0.67	0.798	0.378
9	1479	1.392	1.216	1.277	1.139	0.344	0.667	0.795	0.378
9.2	1479.2	1.382	1.207	1.261	1.13	0.35	0.67	0.792	0.378
9.4	1479.4	1.379	1.197	1.255	1.124	0.35	0.67	0.798	0.383
9.6	1479.6	1.367	1.191	1.252	1.117	0.35	0.67	0.792	0.378
9.8	1479.8	1.36	1.185	1.242	1.108	0.357	0.673	0.792	0.376
10	1480	1.351	1.182	1.236	1.104	0.36	0.673	0.789	0.383
12	1482	1.266	1.117	1.163	1.044	0.354	0.654	0.763	0.378
14	1484	1.209	1.065	1.106	0.99	0.344	0.638	0.744	0.388
16	1486	1.149	1.018	1.059	0.949	0.341	0.623	0.713	0.378
18	1488	1.086	0.978	1.018	0.908	0.354	0.623	0.697	0.388
20	1490	1.048	0.944	0.983	0.879	0.35	0.61	0.691	0.383
22	1492	1.013	0.913	0.949	0.847	0.35	0.597	0.65	0.383
24	1494	0.975	[illegible]86	0.917	0.825	0.363	0.604	0.647	0.388
26	1496	0.947	0.861	0.895	0.8	0.379	0.607	0.65	0.388
28	1498	0.915	0.833	0.864	0.774	0.354	0.572	0.606	0.383
30	1500	0.89	0.815	0.845	0.752	0.366	0.578	0.602	0.383
32	1502	0.858	0.787	0.813	0.727	0.309	0.515	0.539	0.388
34	1504	0.836	0.771	0.801	0.714	0.388	0.582	0.612	0.388
36	1506	0.814	0.744	0.785	0.698	0.385	0.569	0.59	0.393
38	1508	0.795	0.728	0.766	0.682	0.366	0.547	0.564	0.388
40	1510	0.779	0.713	0.747	0.67	0.372	0.544	0.552	0.388
42	1512	0.76	0.697	0.731	0.654	0.376	0.544	0.549	0.393
44	1514	0.745	0.682	0.715	0.641	0.363	0.521	0.536	0.393

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
46	1516	0.732	0.673	0.706	0.631	0.385	0.537	0.539	0.393
48	1518	0.719	0.663	0.696	0.622	0.36	0.509	0.505	0.398
50	1520	0.713	0.654	0.684	0.609	0.382	0.525	0.53	0.403
52	1522	0.694	0.639	0.665	0.597	0.366	0.499	0.52	0.403
54	1524	0.688	0.633	0.655	0.587	0.36	0.499	0.514	0.403
56	1526	0.669	0.62	0.649	0.581	0.372	0.502	0.508	0.398
58	1528	0.659	0.611	0.633	0.571	0.347	0.474	0.441	0.398
60	1530	0.65	0.605	0.63	0.565	0.388	0.509	0.511	0.398
62	1532	0.634	0.589	0.611	0.549	0.335	0.452	0.454	0.403
64	1534	0.637	0.589	0.611	0.546	0.379	0.49	0.492	0.413
66	1536	0.622	0.577	0.602	0.543	0.391	0.496	0.505	0.403
68	1538	0.612	0.571	0.592	0.533	0.382	0.48	0.476	0.403
Step 2									
0	1538.001	2.31	0.623	0.589	0.546	0.372	0.477	0.467	0.398
0.0083	1538.0083	2.357	0.629	0.586	0.546	0.372	0.474	0.47	0.403
0.0166	1538.0166	2.402	0.633	0.586	0.552	0.372	0.474	0.47	0.398
0.025	1538.025	2.509	0.639	0.586	0.552	0.372	0.477	0.47	0.403
0.0333	1538.0333	2.556	0.648	0.589	0.555	0.369	0.477	0.467	0.403
0.0416	1538.0416	2.616	0.654	0.596	0.562	0.369	0.477	0.473	0.403
0.05	1538.05	2.708	0.66	0.592	0.565	0.369	0.474	0.47	0.408
0.0583	1538.0583	2.768	0.666	0.592	0.565	0.369	0.477	0.47	0.408
0.0666	1538.0666	2.79	0.673	0.596	0.571	0.369	0.477	0.47	0.408
0.075	1538.075	2.887	0.679	0.592	0.571	0.369	0.474	0.473	0.403
0.0833	1538.0833	2.947	0.688	0.592	0.577	0.369	0.474	0.47	0.403
0.0916	1538.0916	2.985	0.694	0.596	0.577	0.369	0.474	0.47	0.408
0.1	1538.1	3.067	0.7	0.592	0.584	0.369	0.474	0.47	0.408
0.1083	1538.1083	3.127	0.707	0.592	0.584	0.366	0.477	0.467	0.403
0.1166	1538.1166	3.134	0.716	0.599	0.593	0.369	0.48	0.467	0.403
0.125	1538.125	3.187	0.722	0.596	0.593	0.366	0.474	0.463	0.403
0.1333	1538.1333	3.291	0.731	0.596	0.6	0.366	0.474	0.473	0.408
0.1416	1538.1416	3.32	0.737	0.596	0.606	0.366	0.471	0.467	0.406
0.15	1538.15	3.351	0.744	0.599	0.609	0.366	0.471	0.463	0.408
0.1583	1538.1583	3.38	0.753	0.599	0.616	0.366	0.471	0.467	0.413
0.1666	1538.1666	3.439	0.759	0.596	0.619	0.366	0.471	0.46	0.403
0.175	1538.175	3.449	0.765	0.596	0.625	0.366	0.471	0.467	0.398
0.1833	1538.1833	3.487	0.775	0.599	0.628	0.363	0.471	0.46	0.408
0.1916	1538.1916	3.537	0.781	0.599	0.631	0.366	0.468	0.463	0.413
0.2	1538.2	3.534	0.787	0.599	0.638	0.366	0.474	0.46	0.403
0.2083	1538.2083	3.597	0.796	0.599	0.641	0.366	0.468	0.457	0.408
0.2166	1538.2166	3.61	0.802	0.605	0.644	0.366	0.471	0.457	0.413
0.225	1538.225	3.613	0.808	0.602	0.647	0.366	0.471	0.457	0.408
0.2333	1538.2333	[illegible]	0.818	0.605	0.654	0.366	0.471	0.457	0.403
0.2416	1538.2416	3.685	0.824	0.605	0.66	0.366	0.468	0.46	0.403
0.25	1538.25	3.736	0.83	0.605	0.66	0.366	0.468	0.46	0.408
0.2583	1538.2583	3.692	0.836	0.605	0.666	0.366	0.468	0.457	0.403
0.2666	1538.2666	3.79	0.842	0.608	0.673	0.366	0.468	0.457	0.403
0.275	1538.275	3.793	0.849	0.608	0.676	0.366	0.466	0.454	0.403
0.2833	1538.2833	3.805	0.855	0.608	0.679	0.366	0.471	0.457	0.413
0.2916	1538.2916	3.881	0.861	0.611	0.685	0.366	0.468	0.457	0.413
0.3	1538.3	3.875	[illegible]	0.608	0.689	0.366	0.466	0.457	0.403
0.3083	1538.3083	3.878	0.876	0.611	0.695	0.366	0.468	0.454	0.398
0.3166	1538.3166	3.957	0.879	0.608	0.701	0.363	0.468	0.457	0.403
0.325	1538.325	3.96	0.886	0.611	0.704	0.363	0.468	0.454	0.408
0.3333	1538.3333	3.972	0.892	0.614	0.711	0.363	0.468	0.451	0.408
0.35	1538.35	4.054	0.904	0.618	0.71	0.363	0.468	0.448	0.408
0.3666	1538.3666	4.067	0.917	0.618	0.73	0.363	0.466	0.451	0.403
0.3833	1538.3833	4.124	0.926	0.618	0.733	0.363	0.464	0.454	0.413
0.4	1538.4	4.199	0.941	0.618	0.743	0.363	0.466	0.451	0.408
0.4166	1538.4166	4.203	0.947	0.624	0.755	0.363	0.464	0.451	0.403

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
0.4333	1538.4333	4.3	0.963	0.627	0.762	0.363	0.464	0.457	0.408
0.45	1538.45	4.313	0.972	0.627	0.768	0.363	0.464	0.451	0.406
0.4666	1538.4666	4.344	0.981	0.63	0.777	0.363	0.464	0.451	0.403
0.4833	1538.4833	4.42	0.994	0.633	0.784	0.363	0.464	0.446	0.403
0.5	1538.5	4.395	1.003	0.633	[illegible]	0.363	0.464	0.454	0.408
0.5166	1538.5166	4.493	1.015	0.64	0.803	0.363	0.464	0.451	0.403
0.5333	1538.5333	4.505	1.025	0.64	0.809	0.363	0.464	0.454	0.406
0.55	1538.55	4.502	1.037	0.643	0.819	0.363	0.468	0.454	0.403
0.5666	1538.5666	4.575	1.046	0.646	0.828	0.363	0.464	0.451	0.408
0.5833	1538.5833	4.553	1.055	0.649	0.835	0.363	0.464	0.451	0.403
0.6	1538.6	4.597	1.065	0.649	0.841	0.363	0.464	0.451	0.403
0.6166	1538.6166	4.698	1.074	0.652	0.851	0.363	0.464	0.454	0.413
0.6333	1538.6333	4.657	1.083	0.655	0.86	0.363	0.468	0.454	0.413
0.65	1538.65	4.732	1.092	0.662	0.863	0.363	0.466	0.454	0.403
0.6666	1538.6666	4.732	1.102	0.665	0.873	0.363	0.468	0.451	0.403
0.6833	1538.6833	4.764	1.111	0.665	0.882	0.363	0.464	0.451	0.413
0.7	1538.7	4.824	1.12	0.668	0.889	0.363	0.468	[illegible]	0.413
0.7166	1538.7166	4.839	1.13	0.674	0.898	0.363	0.468	0.454	0.403
0.7333	1538.7333	4.89	[illegible]	0.678	0.904	0.363	0.468	0.448	0.398
0.75	1538.75	4.874	1.145	0.678	0.911	[illegible]	0.468	0.454	0.403
0.7666	1538.7666	4.896	1.154	0.684	0.92	0.363	0.468	0.448	0.398
0.7833	1538.7833	4.959	1.163	0.687	0.927	0.363	0.464	0.451	0.403
0.8	1538.8	4.969	1.17	0.69	0.936	0.363	0.464	0.451	0.403
0.8166	1538.8166	4.997	1.182	0.693	0.943	0.363	0.464	0.451	0.406
0.8333	1538.8333	5.01	1.188	0.7	0.949	0.363	0.464	0.448	0.398
0.85	1538.85	5.047	1.197	0.703	0.955	0.363	0.466	0.445	0.398
0.8666	1538.8666	5.098	1.207	0.706	0.965	0.363	0.468	0.448	0.406
0.8833	1538.8833	5.066	1.213	[illegible]	0.971	0.363	0.468	0.448	0.398
0.9	1538.9	5.129	1.219	0.712	0.974	0.363	0.468	0.451	0.403
0.9166	1538.9166	5.104	1.225	0.722	0.984	0.36	0.464	0.451	0.398
0.9333	1538.9333	5.111	1.234	0.722	0.99	0.36	0.464	0.454	0.403
0.95	1538.95	5.158	1.244	0.728	0.997	0.36	0.461	0.448	0.408
0.9666	1538.9666	5.155	1.25	0.725	1.003	0.36	0.461	0.451	0.403
0.9833	1538.9833	5.205	1.256	0.731	1.012	0.357	0.461	0.454	0.408
1	1539	5.202	1.262	0.731	1.016	0.357	0.461	0.451	0.408
1.2	1539.2	5.4	1.346	0.782	1.089	0.36	0.461	0.454	0.403
1.4	1539.4	5.574	1.417	0.838	1.158	0.363	0.468	0.46	0.408
1.6	1539.6	5.712	1.478	0.886	1.212	0.363	0.471	0.46	0.403
1.8	1539.8	5.766	1.525	0.936	1.26	0.347	0.455	0.451	0.408
2	1540	5.82	1.574	0.98	1.311	0.319	0.427	0.432	0.403
2.2	1540.2	5.892	1.614	1.034	1.352	0.312	0.42	0.413	0.408
2.4	1540.4	5.895	1.654	1.075	1.39	0.306	0.417	0.416	0.408
2.6	1540.6	5.942	1.691	1.122	1.431	0.322	0.433	0.429	0.413
2.8	1540.8	5.987	1.722	1.16	1.46	0.328	0.439	0.422	0.413
3	1541	[illegible]	1.75	1.188	1.489	0.316	0.423	0.416	0.413
3.2	1541.2	[illegible]	1.778	1.22	1.52	0.309	0.427	0.404	0.418
3.4	1541.4	6.094	1.802	1.245	1.543	0.309	0.423	0.394	0.418
3.6	1541.6	6.144	1.827	1.261	1.568	0.312	0.427	0.394	0.408
3.8	1541.8	6.188	1.849	1.277	1.593	0.319	0.436	0.394	0.418
4	1542	6.191	1.87	1.28	1.619	0.325	0.439	0.397	0.418
4.2	1542.2	6.251	1.892	1.286	1.638	0.328	0.446	0.407	0.418
4.4	1542.4	6.239	1.91	1.289	1.66	0.335	0.452	0.41	0.413
4.6	1542.6	[illegible]	1.929	1.289	1.679	0.338	0.458	0.416	0.413
4.8	1542.8	6.302	1.947	1.293	1.698	0.344	0.464	0.435	0.423
5	1543	6.292	1.966	1.299	1.72	0.372	0.49	0.47	0.418
5.2	1543.2	6.308	1.981	1.302	1.736	0.395	0.515	0.492	0.418
5.4	1543.4	6.321	1.994	1.308	1.752	0.398	0.518	0.498	0.418
5.6	1543.6	6.396	2.009	1.305	1.765	0.372	0.496	0.482	0.416
5.8	1543.8	6.358	2.018	1.302	1.774	0.354	0.48	0.476	0.423

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
6	1544	6.349	2.034	1.305	1.79	0.366	0.49	0.476	0.418
6.2	1544.2	6.38	2.043	[illegible]	1.8	0.354	0.477	0.467	0.423
6.4	1544.4	6.418	2.059	1.306	1.812	0.357	0.483	0.473	0.423
6.6	1544.6	6.447	2.068	1.308	1.825	0.357	0.487	0.47	0.423
6.8	1544.8	6.459	2.08	1.311	1.838	0.36	0.49	0.476	0.423
7	1545	6.462	2.099	1.315	1.854	0.388	0.515	0.498	0.418
7.2	1545.2	6.465	2.108	1.318	1.866	0.407	0.537	0.523	0.418
7.4	1545.4	6.494	2.12	1.318	1.879	0.41	0.54	0.539	0.418
7.6	1545.6	6.51	2.129	1.321	1.888	0.414	0.544	0.546	0.418
7.8	1545.8	6.494	2.139	1.324	1.895	0.414	0.544	0.552	0.423
8	1546	6.51	2.145	1.321	1.904	0.41	0.544	0.555	0.418
8.2	1546.2	6.506	2.154	1.327	1.914	0.407	0.544	0.558	0.416
8.4	1546.4	6.541	2.167	1.324	1.923	0.41	0.544	0.555	0.416
8.6	1546.6	6.535	2.173	1.324	1.93	0.407	0.544	0.564	0.413
8.8	1546.8	6.563	2.179	1.327	1.936	0.401	0.54	0.558	0.418
9	1547	6.566	2.185	1.324	1.946	0.395	0.531	0.564	0.413
9.2	1547.2	6.56	2.194	1.756	1.952	0.391	0.528	0.568	0.418
9.4	1547.4	6.566	2.197	1.769	1.958	0.391	0.528	0.555	0.413
9.6	1547.6	6.582	2.207	1.775	1.965	0.388	0.531	0.552	0.418
9.8	1547.8	6.61	2.213	1.781	1.971	0.385	0.528	0.555	0.418
10	1548	6.604	2.219	1.794	1.98	0.382	0.525	0.549	0.418
12	1550	6.661	2.275	1.854	2.038	0.363	0.518	0.539	0.413
14	1552	6.717	2.318	1.901	2.079	0.363	0.531	0.542	0.413
16	1554	6.79	2.352	1.939	2.114	0.354	0.525	0.552	0.413
18	1556	6.787	2.379	1.967	2.139	0.344	0.531	0.58	0.429
20	1558	6.821	2.404	1.996	2.168	0.35	0.54	0.593	0.418
22	1560	6.847	2.429	2.021	2.19	0.357	0.553	0.615	0.423
24	1562	6.872	2.441	2.034	2.203	0.325	0.534	0.634	0.429
26	1564	6.916	2.466	2.056	2.225	0.344	0.556	0.64	0.423
28	1566	6.916	2.478	2.068	2.241	0.338	0.559	0.637	0.423
30	1568	6.941	2.491	2.081	2.25	0.331	0.559	0.647	0.423
32	1570	6.954	2.509	2.097	2.266	0.344	0.582	0.669	0.429
34	1572	6.992	2.518	2.109	2.279	0.338	0.582	0.665	0.416
36	1574	6.982	2.528	2.119	2.288	0.335	0.585	0.691	0.423
38	1576	7.01	2.537	2.128	2.301	0.338	0.594	0.694	0.423
40	1578	6.988	2.543	2.138	2.304	0.319	0.582	0.697	0.423
42	1580	6.995	2.552	2.141	2.307	0.309	0.585	0.684	0.429
44	1582	7.054	2.561	2.153	2.323	0.322	0.6	0.716	0.418
46	1584	7.042	2.568	2.16	2.326	0.319	0.604	0.71	0.416
48	1586	7.048	2.574	2.166	2.333	0.312	0.6	0.719	0.416
50	1588	7.07	2.577	2.172	2.339	0.312	0.607	0.71	0.418
52	1590	7.064	2.586	2.179	2.345	0.316	0.613	0.732	0.416
54	1592	7.058	2.592	2.185	2.352	0.309	0.61	0.729	0.418
56	1594	7.092	2.592	2.185	2.355	0.303	0.607	0.735	0.423
58	1596	7.095	2.595	2.191	2.361	0.305	0.619	0.729	[illegible]
60	1598	7.092	2.605	2.197	2.364	0.309	0.629	0.741	[illegible]
62	1600	7.083	2.608	2.201	2.368	0.312	0.632	0.757	0.423
64	1602	7.086	2.611	2.201	2.371	0.3	0.623	0.754	0.423
66	1604	7.089	2.611	2.207	2.377	0.297	0.626	0.738	0.421
68	1606	7.124	2.617	2.21	2.38	0.306	0.635	0.754	0.423
70	1608	7.13	2.62	2.213	2.383	0.29	0.626	0.757	0.429
72	1610	[illegible]	2.623	2.216	2.387	0.3	0.638	0.763	0.423
74	1612	7.124	2.626	2.22	2.39	0.29	0.635	0.754	0.429
76	1614	7.099	2.629	2.223	2.39	0.284	0.629	0.76	0.429
78	1616	7.136	2.632	2.226	2.396	0.297	0.645	0.757	0.429
80	1618	7.124	2.632	2.226	2.396	0.297	0.645	0.766	0.434
82	1620	7.13	2.636	2.232	2.399	0.293	0.645	0.773	0.429
84	1622	7.14	2.639	2.232	2.403	0.293	0.648	0.77	0.429
86	1624	7.14	2.639	2.232	2.406	0.281	0.638	0.77	0.434

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
88	1626	7.168	2.642	2.238	2.406	0.281	0.642	0.763	0.434
90	1628	7.14	2.648	2.242	2.409	0.303	0.661	0.773	0.434
92	[illegible]	7.146	2.648	2.242	2.412	0.297	0.657	0.789	0.434
94	1632	7.162	2.651	2.245	2.415	0.29	0.651	0.779	0.434
96	1634	7.149	2.651	2.245	2.415	0.274	0.642	0.776	0.439
98	1636	7.152	2.654	2.251	2.415	0.293	0.661	0.779	0.439
100	1638	7.146	2.648	2.245	2.412	0.284	0.651	0.779	0.439
105	1643	7.136	2.654	2.248	2.418	0.297	0.664	0.789	0.439
110	1648	7.158	2.657	2.254	2.425	0.29	0.664	0.782	0.444
115	1653	7.162	2.663	2.257	2.428	0.325	0.654	0.785	0.449
120	1658	7.196	2.666	2.264	2.434	0.338	0.67	0.798	0.444
125	1663	7.203	2.673	2.267	2.437	0.338	0.673	0.798	0.444
130	1668	7.19	2.676	2.27	2.444	0.338	0.676	0.801	0.449
135	1673	7.206	2.679	2.273	2.444	0.331	0.67	0.798	0.454
140	1678	[illegible]	2.682	2.276	2.45	0.341	0.68	0.808	0.454
145	1683	[illegible]	2.688	2.283	2.45	0.331	0.676	0.808	0.459
150	1688	7.19	2.679	2.279	2.437	0.335	0.68	0.811	0.454
155	1693	7.209	2.682	2.273	2.444	0.331	0.68	0.814	0.454
160	1698	7.225	2.694	2.289	2.461	0.318	0.689	0.814	0.459
165	1703	7.212	2.697	2.292	2.466	0.338	0.692	0.817	0.454
170	1708	7.228	2.7	2.295	2.466	0.335	0.692	0.823	0.459
175	1713	7.247	2.7	2.295	2.469	0.338	0.692	0.82	0.459
180	1718	7.24	2.703	2.298	2.472	0.341	0.699	0.826	0.465
185	1723	7.256	2.706	2.302	2.472	0.341	0.699	0.83	0.469
190	1728	7.215	2.71	2.298	2.472	0.338	0.699	0.833	0.479
195	1733	7.256	2.713	2.305	2.482	0.347	0.705	0.833	0.469
200	1738	7.243	2.713	2.308	2.482	0.344	0.705	0.836	0.469
205	1743	7.256	2.716	2.311	2.485	0.347	0.708	0.839	0.469
210	1748	7.247	2.719	2.311	2.488	0.35	0.708	0.839	0.469
215	1753	7.259	2.719	2.314	2.488	0.35	0.711	0.842	0.474
220	1758	7.25	2.722	2.314	2.488	0.347	0.711	0.842	0.474
225	1763	7.284	2.722	2.314	2.488	0.347	0.714	0.845	0.479
230	1768	7.291	2.725	2.317	2.491	0.347	0.714	0.849	0.479
235	1773	7.284	2.725	2.32	2.495	0.35	0.714	0.849	0.479
240	1778	7.266	2.725	2.32	2.495	0.35	0.714	0.852	0.484
245	1783	7.269	2.728	2.32	2.498	0.347	0.714	0.849	0.484
250	1788	7.262	2.728	2.32	2.498	0.35	0.718	0.849	0.479
255	1793	7.288	2.728	2.324	2.501	0.35	0.718	0.855	0.484
260	1798	7.278	2.731	2.324	2.501	0.35	0.721	0.855	0.484
265	1803	7.303	2.731	2.324	2.501	0.35	0.721	0.855	0.484
270	1808	7.284	2.731	2.327	2.504	0.35	0.721	0.855	0.484
275	1813	7.284	2.731	2.327	2.504	0.35	0.724	0.855	0.489
280	1818	7.278	2.734	2.327	2.504	0.35	0.724	0.855	0.489
285	1823	7.316	2.734	2.33	2.504	0.35	0.724	0.855	0.489
290	1828	7.313	2.737	2.33	2.507	0.354	0.73	0.858	0.489
295	[illegible]	7.313	2.737	2.333	2.507	0.354	0.73	0.858	0.484
300	1838	7.288	2.737	2.333	2.51	0.354	0.73	0.861	0.484
305	1843	7.3	2.74	2.333	2.51	0.354	0.73	0.864	0.484
310	1848	7.341	2.74	2.336	2.51	0.357	0.733	0.867	0.479
315	1853	7.306	2.74	2.336	2.514	0.357	0.733	0.864	0.479
320	1858	7.297	2.743	2.336	2.514	0.36	0.737	0.871	0.474
325	1863	7.316	2.743	2.339	2.514	0.363	0.74	0.871	0.469
330	1868	7.303	2.743	2.339	2.517	0.366	0.74	0.874	0.464
335	1873	7.297	2.743	2.339	2.517	0.369	0.743	0.874	0.464
340	1878	7.31	2.743	2.339	2.517	0.369	0.74	0.874	0.464
345	1883	7.316	2.743	2.339	2.517	0.369	0.74	0.877	0.464
350	1888	7.322	2.747	2.343	2.517	0.372	0.743	0.877	0.464
355	1893	7.338	2.743	2.343	2.517	0.376	0.746	0.877	0.464
360	1898	7.294	2.743	2.339	2.52	0.376	0.743	0.877	0.459

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
365	1903	7.303	2.747	2.343	2.52	0.376	0.746	0.88	0.459
370	1908	7.319	2.747	2.343	2.52	0.376	0.743	0.877	0.454
375	1913	7.303	2.75	2.346	2.523	0.376	0.746	0.88	0.459
380	1918	7.316	2.75	2.346	2.523	0.376	0.746	0.88	0.454
385	1923	7.322	2.75	2.346	2.523	0.379	0.749	0.883	0.454
390	1928	7.313	2.75	2.346	2.523	0.379	0.746	0.88	0.459
395	1933	7.316	2.75	2.346	2.523	0.379	0.746	0.88	0.459
400	1938	7.328	2.75	2.346	2.523	0.379	0.746	0.88	0.459
405	1943	7.354	2.75	2.346	2.526	0.379	0.749	0.88	0.459
410	1948	7.354	2.753	2.349	2.526	0.379	0.749	0.88	0.454
415	1953	7.31	2.75	2.349	2.526	0.382	0.752	0.88	0.454
420	1958	7.338	2.75	2.349	2.526	0.382	0.749	0.88	0.454
425	1963	7.319	2.753	2.349	2.526	0.382	0.749	0.88	0.454
430	1968	7.325	2.753	2.349	2.529	0.382	0.752	0.88	0.454
435	1973	7.332	2.753	2.349	2.529	0.379	0.752	0.88	0.459
440	1978	7.338	2.753	2.349	2.529	0.379	0.749	0.88	0.459
445	1983	7.354	2.753	2.349	2.529	0.382	0.752	0.88	0.459
450	1988	7.335	2.753	2.349	2.529	0.382	0.752	0.88	0.454
455	1993	7.328	2.753	2.349	2.529	0.385	0.755	0.883	0.454
460	1998	7.341	2.753	2.352	2.529	0.385	0.749	0.883	0.454
465	2003	7.373	2.753	2.352	2.529	0.388	0.755	0.883	0.449
470	2008	7.344	2.756	2.352	2.533	0.388	0.759	0.883	[illegible]
475	2013	7.382	2.756	2.352	2.533	0.391	0.759	0.886	0.444
480	2018	7.351	2.756	2.352	2.533	0.388	0.759	0.886	0.449
485	2023	7.338	2.756	2.352	2.533	0.388	0.759	0.886	0.449
490	2028	7.328	2.756	2.352	2.529	0.385	0.759	0.89	0.449
495	2033	7.351	2.756	2.355	2.533	0.388	0.759	0.886	0.444
500	2038	7.347	2.756	2.355	2.536	0.388	0.759	0.886	0.444
505	2043	7.391	2.756	2.355	2.536	0.395	0.762	0.89	0.444
510	2048	7.344	2.756	2.355	2.536	0.395	0.762	0.89	0.439
515	2053	7.366	2.756	2.355	2.539	0.395	0.762	0.89	0.439
520	2058	7.344	2.759	2.355	2.539	0.395	0.765	0.893	0.434
525	2063	7.357	2.759	2.358	2.539	0.398	0.765	0.89	0.434
530	2068	7.363	2.759	2.358	2.539	0.395	0.765	0.89	0.429
535	2073	7.354	2.759	2.358	2.539	0.395	0.765	0.893	0.429
540	2078	7.335	2.759	2.358	2.539	0.398	0.768	0.893	0.429
545	2083	7.36	2.759	2.358	2.539	0.395	0.762	0.89	0.429
550	2088	7.363	2.759	2.358	2.542	0.398	0.768	0.89	0.423
555	2093	7.347	2.759	2.358	2.542	0.395	0.765	0.893	0.418
560	2098	7.369	2.759	2.358	2.539	0.398	0.765	0.89	0.423
565	2103	7.36	2.759	2.358	2.542	0.398	0.768	0.896	0.423
570	2108	7.363	2.759	2.358	2.542	0.401	0.768	0.896	0.418
575	2113	7.382	2.759	2.358	2.542	0.401	0.768	0.893	0.413
580	2118	7.351	2.762	2.361	2.542	0.401	0.771	0.89	0.408
585	2123	7.354	2.762	2.361	2.545	0.404	0.771	0.893	0.403
590	2128	7.351	2.759	2.361	2.545	0.401	0.771	0.89	0.403
595	2133	7.344	2.762	2.361	2.545	0.404	0.774	0.893	0.398
600	2138	7.369	2.762	2.361	2.545	0.407	0.774	0.896	0.393
605	2143	7.369	2.762	2.365	2.545	0.407	0.774	0.896	0.393
610	2148	7.366	2.762	2.361	2.548	0.41	0.774	0.896	0.393
615	2153	7.404	2.762	2.365	2.548	0.414	0.778	0.899	0.388
620	2158	7.369	2.762	2.361	2.548	0.41	0.778	0.902	0.388
625	2163	7.363	2.762	2.361	2.545	0.407	0.774	0.899	0.393
630	2168	7.36	2.759	2.361	2.548	0.404	0.771	0.896	0.393
635	2173	7.376	2.762	2.361	2.545	0.407	0.771	0.896	0.393
640	2178	7.376	2.762	2.361	2.545	0.41	0.778	0.896	0.388
645	2183	7.373	2.762	2.361	2.548	0.407	0.774	0.896	0.393
650	2188	7.376	2.762	2.361	2.548	0.41	0.778	0.896	0.393
655	2193	7.385	2.762	2.361	2.548	0.414	0.778	0.899	0.393

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
660	2198	7.354	2.762	2.361	2.552	0.414	0.778	0.899	0.388
665	2203	7.354	2.762	2.361	2.552	0.414	0.778	0.896	0.388
670	2208	7.382	2.762	2.365	2.552	0.417	0.781	0.902	0.393
675	2213	7.376	2.762	[illegible]	2.552	0.414	0.778	0.899	0.393
680	2218	7.36	2.762	2.365	2.552	0.417	0.781	0.899	0.393
685	2223	7.388	2.765	2.365	2.552	0.417	0.781	0.899	0.393
690	2228	7.376	2.762	2.365	2.552	0.417	0.781	0.899	0.393
695	2233	7.357	2.765	2.365	2.555	0.414	0.781	0.899	0.393
700	2238	7.407	2.762	2.368	2.555	0.417	0.781	0.902	0.393
705	2243	7.401	2.765	2.365	2.555	0.417	0.784	0.902	0.393
710	2248	7.391	2.765	2.368	2.555	0.417	0.784	0.902	0.393
715	2253	7.414	2.762	2.365	2.555	0.417	0.781	0.902	0.393
720	2258	7.388	2.762	2.365	2.555	0.414	0.781	0.902	0.398
725	2263	7.395	2.765	2.365	2.555	0.414	0.781	0.902	0.398
730	2268	7.373	2.765	2.368	2.558	0.417	0.784	0.902	0.393
735	2273	7.395	2.765	2.368	2.558	0.42	0.787	0.902	0.388
740	2278	7.439	2.765	2.368	2.558	0.42	0.787	0.905	0.383
745	2283	7.429	2.768	2.368	2.561	0.423	0.787	0.905	0.383
750	2288	7.385	2.768	2.368	2.561	0.426	0.79	0.905	0.378
755	2293	7.382	2.768	2.371	2.561	0.426	0.79	0.908	0.378
760	2298	7.385	2.765	2.371	2.561	0.426	0.79	0.905	0.373
765	2303	7.373	2.768	2.371	2.561	0.429	0.79	0.908	0.373
770	2308	7.373	2.768	2.371	2.561	0.429	0.79	0.908	0.378
775	2313	7.414	2.768	2.371	2.561	0.423	0.787	0.905	0.378
780	2318	7.414	2.768	2.368	2.561	0.426	0.79	0.905	0.378
785	2323	7.41	2.768	2.371	2.561	0.423	0.79	0.908	0.378
790	2328	7.382	2.768	2.371	2.561	0.426	0.79	0.908	0.378
795	2333	7.426	2.768	2.371	2.564	0.426	0.793	0.908	0.378
800	2338	7.385	2.768	2.371	2.564	0.426	0.793	0.908	0.373
805	2343	7.414	2.771	2.371	2.568	0.429	0.793	0.908	0.373
810	2348	7.41	2.771	2.374	2.568	0.429	0.797	0.899	0.373
815	2353	7.407	2.774	2.374	2.571	0.429	0.797	0.915	0.368
820	2358	7.454	2.774	2.377	2.571	0.433	0.797	0.915	0.368
825	2363	7.417	2.774	2.374	2.571	0.433	0.797	0.915	0.363
830	2368	7.461	2.777	2.377	2.574	0.436	0.8	0.918	0.358
835	2373	7.426	2.777	2.38	2.574	0.436	0.8	0.915	0.363
840	2378	7.436	2.777	2.38	2.574	0.439	0.803	0.918	0.353
845	2383	7.445	2.777	2.384	2.574	0.439	0.803	0.918	0.348
850	2388	7.451	2.781	2.384	2.577	0.442	0.806	0.921	0.343
855	2393	7.414	2.781	2.384	2.577	0.489	0.806	0.921	0.343
860	2398	7.442	2.781	2.387	2.577	0.493	0.806	0.921	0.333
865	2403	7.41	2.781	2.384	2.577	0.493	0.806	0.924	0.333
870	2408	7.458	2.781	2.384	2.58	0.493	0.806	0.924	0.328
875	2413	7.458	2.781	2.387	2.577	0.496	0.809	0.924	0.323
880	2418	7.426	2.784	2.39	2.58	0.496	0.809	0.924	0.312
885	2423	7.436	2.784	2.39	2.58	0.496	0.809	0.927	0.302
890	2428	7.42[illegible]	2.784	2.39	2.583	0.496	0.809	0.927	0.297
895	2433	7.445	2.784	2.39	2.583	0.496	0.809	0.924	0.292
900	2438	7.439	2.784	2.393	2.583	0.499	0.809	0.924	0.277
905	2443	7.464	2.784	2.393	2.587	0.499	0.812	0.924	0.267
910	2448	7.442	2.784	2.393	2.587	0.496	0.809	0.924	0.262
915	2453	7.47	2.787	2.393	2.587	0.499	0.812	0.927	0.252
920	2458	7.47	2.787	2.396	2.59	0.502	0.816	0.927	0.242
925	2463	7.451	2.793	2.396	2.587	0.499	0.812	0.927	0.237
930	2468	7.445	2.787	2.393	2.59	0.502	0.816	0.927	0.237
935	2473	7.473	2.787	2.396	2.593	0.502	0.816	0.927	0.232
940	2478	7.473	2.787	2.396	2.593	0.499	0.812	0.927	0.222
945	2483	7.502	2.787	2.399	2.593	0.502	0.819	0.927	0.217
950	2488	7.448	2.787	2.396	2.593	0.502	0.816	0.927	0.211

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
955	2493	7.461	2.787	2.399	2.593	0.505	0.819	0.927	0.211
960	2498	7.439	2.787	2.399	2.596	0.508	0.822	0.927	0.211
965	2503	7.461	2.79	2.399	2.596	0.499	0.816	0.927	0.206
970	2508	7.47	2.793	2.402	2.599	0.508	0.822	0.931	0.201
975	2513	7.451	2.79	2.402	2.599	0.512	0.828	0.927	0.196
980	2518	7.47	2.793	2.406	2.602	0.512	0.825	0.931	0.191
985	2523	7.461	2.793	2.406	2.602	0.512	0.828	0.927	0.186
990	2528	7.489	2.796	2.406	2.606	0.512	0.828	0.934	0.181
995	2533	7.533	2.793	2.406	2.606	0.508	0.822	0.931	0.181
1000	2538	7.514	2.796	2.409	2.606	0.521	0.835	0.934	0.176
1005	2543	7.464	2.796	2.409	2.606	0.518	0.835	0.934	0.171
1010	2548	7.539	2.796	2.409	2.609	0.521	0.835	0.937	0.171
1015	2553	7.499	2.793	2.409	2.609	0.515	0.828	0.94	0.176
1020	2558	7.467	2.796	2.409	2.609	0.521	0.835	0.937	0.171
1025	2563	7.464	2.796	2.409	2.612	0.515	0.828	0.937	0.171
1030	2568	7.492	2.796	2.412	2.612	0.524	0.841	0.927	0.171
1035	2573	7.502	2.796	2.409	2.609	0.512	0.825	0.94	0.166
1040	2578	7.464	2.796	2.409	2.612	0.505	0.822	0.934	0.171
1045	2583	7.502	2.799	2.415	2.615	0.518	0.831	0.931	0.166
1050	2588	7.527	2.799	2.412	2.615	0.518	0.838	0.94	0.161
1055	2593	7.48	2.799	2.412	2.615	0.505	0.822	0.943	0.161
1060	2598	7.502	2.799	2.412	2.615	0.515	0.828	0.943	0.161
1065	2603	7.511	2.799	2.412	2.615	0.505	0.822	0.937	0.156
1070	2606	7.508	2.802	2.415	2.618	0.521	0.838	0.94	0.146
1075	2613	7.508	2.802	2.415	2.618	0.521	0.838	0.927	0.151
1080	2618	7.527	2.802	2.412	2.618	0.508	0.828	0.934	0.156
1085	2623	7.511	2.799	2.415	2.618	0.518	0.831	0.94	0.151
1090	2628	7.543	2.799	2.412	2.618	0.502	0.819	0.94	0.151
1095	2633	7.527	2.799	2.415	2.621	0.518	0.838	0.937	0.151
1100	2638	7.533	2.799	2.415	2.621	0.521	0.841	0.931	0.156
1105	2643	7.511	2.802	2.418	2.621	0.512	0.835	0.943	0.146
1110	2648	7.502	2.799	2.418	2.621	0.518	0.838	0.934	0.146
1115	2653	7.514	2.799	2.415	2.621	0.502	0.828	0.934	0.141
1120	2658	7.536	2.814	2.418	2.644	0.502	0.831	0.937	0.141
1125	2663	7.499	2.811	2.428	2.637	0.508	0.838	0.937	0.141
1130	2668	7.502	2.811	2.428	2.634	0.524	0.85	0.94	0.131
1135	2673	7.521	2.811	2.428	2.634	0.508	0.838	0.953	0.126
1140	2678	7.539	2.805	2.428	2.631	0.512	0.838	0.946	0.121
1145	2683	7.524	2.808	2.424	2.631	0.508	0.838	0.943	0.116
1150	2688	7.517	2.808	2.424	2.631	0.515	0.841	0.931	0.111
1155	2693	7.502	2.808	2.418	2.631	0.505	0.835	0.934	0.111
1160	2698	7.53	2.799	2.421	2.631	0.496	0.825	0.943	0.121
1165	2703	7.558	2.811	2.424	2.634	0.518	0.841	0.937	0.116
1170	2708	7.517	2.805	2.421	2.631	0.518	0.841	0.943	0.131
1175	2713	7.565	2.808	2.424	2.631	0.518	0.844	0.946	0.126
1180	2718	7.514	2.811	2.428	2.637	0.54	0.863	0.937	0.131
1185	2723	7.552	2.808	2.424	2.637	0.534	0.857	0.931	0.126
1190	2728	7.543	2.811	2.428	2.637	0.54	0.863	0.946	0.126
1195	2733	7.536	2.805	2.424	2.634	0.515	0.841	0.931	0.131
1200	2738	7.574	2.808	2.421	2.634	0.499	0.828	0.943	0.121
1205	2743	7.521	2.811	2.428	2.64	0.534	0.86	0.975	0.126
1210	2748	7.521	2.808	2.421	2.634	0.505	0.835	0.927	0.126
1215	2753	7.546	2.805	2.421	2.634	0.515	0.844	0.934	0.126
1220	2758	8.021	2.885	2.434	2.707	0.521	0.854	0.95	0.126
1225	2763	8.028	2.916	2.481	2.742	0.512	0.841	0.931	0.126
1230	2768	8.078	2.929	2.501	2.752	0.505	0.844	0.946	0.126
1235	2773	8.084	2.938	2.522	2.761	0.518	0.86	0.934	0.126
1240	2778	8.087	2.944	2.522	2.764	0.496	0.841	0.965	0.126
1245	2783	8.087	2.95	2.535	2.774	0.527	0.873	0.943	0.121

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1250	2788	8.135	2.953	2.532	2.774	0.496	0.844	0.95	0.116
1255	2793	8.103	2.956	2.538	2.777	0.508	0.86	0.965	0.116
1260	2798	8.128	2.956	2.541	2.78	0.496	0.85	0.965	0.121
1265	2803	8.128	2.956	2.535	2.777	0.477	0.838	0.962	0.116
1270	2808	8.122	2.963	2.544	2.783	0.508	0.86	0.95	0.116
1275	2813	8.109	2.966	2.547	2.786	0.515	0.869	0.959	0.105
1280	2818	8.109	2.963	2.547	2.783	0.486	0.847	0.959	0.116
1285	2823	8.147	2.969	2.547	2.786	0.48	0.838	0.975	0.116
1290	2828	8.116	2.972	2.554	2.79	0.553	0.879	0.94	0.116
1295	2833	8.113	2.975	2.554	2.79	0.527	0.857	0.943	0.116
1300	2838	8.109	2.969	2.551	2.79	0.534	0.866	0.962	0.111
1305	2843	8.119	2.972	2.551	2.79	0.537	0.869	0.978	0.116
1310	2848	8.125	2.975	2.554	2.796	0.518	0.857	1.006	0.121
1315	2853	8.135	2.975	2.56	2.799	0.521	0.854	0.959	0.116
1320	2858	8.122	2.975	2.554	2.796	0.537	0.873	0.981	0.126
1325	2863	8.122	2.981	2.563	2.802	0.549	0.882	0.956	0.121
1330	2868	8.125	2.978	[illegible]	2.802	0.527	0.863	0.981	0.116
1335	2873	8.128	2.978	2.56	2.802	0.518	0.857	0.962	0.111
1340	2878	8.166	2.981	2.563	2.805	0.531	0.869	1	0.116
1345	2883	8.125	2.984	2.563	2.805	0.537	0.876	0.978	0.121
1350	2888	8.138	2.981	2.566	2.805	0.515	0.857	0.981	0.116
1355	2893	8.179	2.984	2.566	2.809	0.546	0.885	0.981	0.116
1360	2898	8.166	2.984	2.566	2.809	0.534	0.876	0.987	0.116
1365	2903	8.141	2.987	2.57	2.812	0.537	0.882	0.975	0.116
1370	2908	8.147	2.984	2.566	2.812	0.515	0.863	0.975	0.111
1375	2913	8.15	2.987	2.573	2.812	0.531	0.879	0.978	0.116
1380	2918	8.131	2.984	2.566	2.812	0.521	0.869	0.984	0.111
1385	2923	8.175	2.99	2.573	2.815	0.543	0.888	0.987	0.1
1390	2928	8.163	2.99	2.573	2.815	0.524	0.876	0.991	0.111
1395	2933	8.138	2.99	2.573	2.812	0.537	0.888	1.003	0.116
1400	2938	8.17[illegible]	2.99	2.573	2.818	0.524	0.876	0.968	0.105
1405	2943	8.16	2.993	2.579	2.821	0.546	0.901	0.972	0.1
1410	2948	8.179	2.993	2.576	2.821	0.512	0.86	0.991	0.105
1415	2953	8.16	2.993	2.576	2.821	0.524	0.876	0.991	0.111
1420	2958	8.194	2.993	2.579	2.824	0.515	0.869	0.981	0.105
1425	2963	8.188	3	2.582	2.828	0.546	0.901	0.991	0.095
1430	2968	8.169	3	2.582	2.828	0.54	0.895	1.003	0.095
1435	2973	8.182	2.993	2.57	2.821	0.474	0.831	0.905	0.1
1440	2978	8.175	3.006	2.588	2.831	0.556	0.91	1.035	0.105
1445	2983	8.213	3.003	2.588	2.831	0.549	0.901	1.022	0.1
1450	2988	8.188	3.003	2.585	2.831	0.546	0.901	0.997	0.105
1455	2993	8.185	3.003	2.588	2.831	0.524	0.885	1	0.105
1460	2998	8.182	3.003	2.588	2.831	0.518	0.876	0.991	0.105
1465	3003	8.213	3	2.585	2.831	0.521	0.879	1.009	0.111
1470	3008	8.204	3.003	2.582	2.831	0.512	0.873	1	0.111
1475	3013	8.185	3.003	2.588	2.834	0.531	0.888	1.003	0.116
1480	3018	8.169	3.003	2.588	2.834	0.521	0.885	1.003	0.111
1485	3023	8.191	3	2.588	2.831	0.518	0.882	0.994	0.116
1490	3028	8.175	3.003	2.588	2.831	0.524	0.888	0.987	0.116
1495	3033	8.223	3.006	2.592	2.837	0.527	0.891	0.994	0.105
1500	3038	8.175	3.006	2.592	2.84	0.527	0.891	0.994	0.1
1505	3043	8.207	3.006	2.595	2.84	0.531	0.898	0.994	0.095
1510	3048	8.201	3.006	2.592	2.84	0.531	0.895	1	0.095
1515	3053	8.191	3.009	2.592	2.84	0.521	0.885	1.003	0.095
1520	3058	8.21	3.009	2.595	2.844	0.512	0.876	0.991	0.1
1525	3063	8.194	3.009	2.598	2.844	0.575	0.898	1.009	0.1
1530	3068	8.204	3.012	2.598	2.847	0.572	0.895	1	0.1
1535	3073	8.267	3.015	2.601	2.85	0.568	0.891	1.006	0.105
1540	3078	8.232	3.015	2.601	2.85	0.568	0.895	1.022	0.1

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1545	3083	8.188	3.015	2.601	2.85	0.567	0.885	1.003	0.1
1550	3088	8.223	3.012	2.601	2.85	0.559	0.885	1.013	0.105
1555	3093	8.232	3.015	2.604	2.85	0.568	0.895	1.013	0.105
1560	3098	8.242	3.015	2.604	2.853	0.578	0.901	1.013	0.1
1565	3103	8.226	3.015	2.604	2.853	0.572	0.898	1.013	0.1
1570	3108	8.198	3.015	2.604	2.856	0.568	0.895	1.016	0.1
1575	3113	8.229	3.015	2.604	2.856	0.565	0.891	1.016	0.1
1580	3118	8.213	3.018	2.607	2.856	0.572	0.901	1.013	0.095
1585	3123	8.21	3.018	2.604	2.856	0.568	0.895	1.013	0.1
1590	3128	8.238	3.018	2.604	2.859	0.568	0.895	1.009	0.095
1595	3133	8.229	3.021	2.607	2.859	0.565	0.895	1.009	0.1
1600	3138	8.238	3.021	2.607	2.863	0.572	0.901	1.019	0.1
1605	3143	8.22	3.021	2.607	2.859	0.565	0.898	1.016	0.105
1610	3148	8.232	3.021	2.607	2.859	0.565	0.898	1.019	0.105
1615	3153	8.235	3.021	2.607	2.863	0.575	0.904	1.019	0.105
1620	3158	8.238	3.021	2.611	2.863	0.572	0.901	1.019	0.111
1625	3163	8.226	3.024	2.611	2.863	0.575	0.904	1.019	0.116
1630	3168	8.248	3.024	2.611	2.866	0.572	0.901	1.019	0.121
1635	3173	8.276	3.024	2.611	2.866	0.578	0.907	1.019	0.116
1640	3178	8.248	3.027	2.614	2.866	0.578	0.907	1.022	0.111
1645	3183	8.286	3.03	2.617	2.869	0.581	0.914	1.022	0.105
1650	3188	8.254	3.03	2.617	2.872	0.587	0.914	1.028	0.105
1655	3193	8.27	3.037	2.62	2.872	0.581	0.91	1.025	0.105
1660	3198	8.292	3.037	2.62	2.875	0.597	0.92	1.028	0.085
1665	3203	8.267	3.04	2.623	2.878	0.603	0.926	1.035	0.085
1670	3208	8.251	3.04	2.626	2.878	0.606	0.923	1.041	0.08
1675	3213	8.286	3.04	2.626	2.882	0.603	0.92	1.038	0.075
1680	3218	8.298	3.043	2.626	2.882	0.613	0.926	1.041	0.08
1685	3223	8.292	3.046	2.626	2.885	0.619	0.929	1.044	0.065
1690	3228	8.298	3.046	2.629	2.885	0.622	0.933	1.047	0.06
1695	3233	8.286	3.046	2.629	2.885	0.625	0.929	1.051	0.06
1700	3238	8.32	3.046	2.633	2.885	0.629	0.926	1.051	0.055
1705	3243	8.273	3.049	2.633	2.888	0.632	0.933	1.047	0.055
1710	3248	8.323	3.049	2.633	2.888	0.635	0.933	1.054	0.045
1715	3253	8.273	3.049	2.636	2.888	0.638	0.933	1.054	0.04
1720	3258	8.323	3.049	2.636	2.888	0.641	0.936	1.054	0.035
1725	3263	8.327	3.049	2.636	2.891	0.647	0.939	1.057	0.025
1730	3268	8.301	3.049	2.639	2.891	0.654	0.939	1.063	0.02
1735	3273	8.276	3.049	2.639	2.891	0.657	0.939	1.063	0.015
1740	3278	8.308	3.049	2.639	2.891	0.66	0.942	[illegible]	0.005
1745	3283	8.295	3.052	2.642	2.891	0.666	0.942	1.063	0
1750	3288	8.273	3.052	2.642	2.891	0.67	0.945	1.066	-0.01
1755	3293	8.32	3.049	2.642	2.875	0.673	0.945	1.066	0.015
1760	3298	8.273	3.049	2.642	2.888	0.673	0.945	1.066	0.02
1765	3303	8.267	3.049	2.642	2.888	0.679	0.942	1.066	0.02
1770	3308	8.295	3.049	2.642	2.888	0.679	0.942	1.066	0.03
1775	3313	8.257	3.049	2.642	2.888	0.679	0.942	1.066	-0.03
1780	3318	8.27	3.049	2.639	2.888	0.682	0.942	1.066	0.035
1785	3323	8.327	3.049	2.642	2.888	0.682	0.942	1.063	0.035
1790	3328	8.276	3.046	2.639	2.888	0.682	0.939	1.063	0.04
1795	3333	8.298	3.046	2.639	2.888	0.685	0.942	1.063	0.045
1800	3338	8.279	3.046	2.639	2.888	0.685	0.942	1.063	0.05
1805	3343	8.267	3.046	2.642	2.888	0.692	0.945	1.066	0.055
1810	3348	8.311	3.049	2.642	2.891	0.695	0.945	1.063	0.06
1815	3353	8.292	3.049	2.642	2.891	0.695	0.948	1.066	-0.065
1820	3358	8.283	3.049	2.642	2.891	0.701	0.948	1.066	0.075
1825	3363	8.279	3.049	2.642	2.891	0.704	0.948	1.069	0.08
1830	3368	8.279	3.046	2.642	2.891	0.704	0.948	1.069	-0.08
1835	3373	8.273	3.046	2.642	2.888	0.701	0.945	1.066	-0.085

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
1840	3378	8.292	3.046	2.642	2.891	0.708	0.948	1.066	0.09
1845	3383	8.301	3.046	2.642	2.891	0.711	0.948	1.066	0.095
1850	3388	8.308	3.049	2.645	2.891	0.714	0.952	1.066	0.095
1855	3393	8.276	3.046	2.642	2.891	0.714	0.945	1.066	-0.095
1860	3398	8.264	3.046	2.642	2.891	0.714	0.948	1.063	-0.1
1865	3403	8.283	3.046	2.645	2.891	0.717	0.952	1.066	0.105
1870	3408	8.311	3.046	2.642	2.894	0.717	0.948	1.066	0.105
1875	3413	8.295	3.046	2.645	2.891	0.717	0.948	1.066	0.105
1880	3418	8.248	3.033	2.642	2.882	0.717	0.948	1.066	0.105
1885	3423	7.59	2.916	2.617	2.767	0.72	0.948	1.066	0.111
1890	3428	7.835	2.941	2.585	2.786	0.72	0.945	1.06	0.105
1895	3433	7.829	2.938	2.576	2.79	0.723	0.945	1.057	0.116
1900	3438	7.842	2.935	2.57	2.786	0.723	0.942	1.054	0.111
1905	3443	7.842	2.932	2.563	2.786	0.723	0.939	1.051	0.111
1910	3448	7.842	2.932	2.56	2.786	0.73	0.945	1.051	-0.121
1915	3453	7.895	2.932	2.56	2.786	0.73	0.942	1.051	-0.121
1920	3458	7.914	2.932	2.56	2.786	0.733	0.945	1.047	-0.121
1925	3463	8.153	2.969	2.563	2.824	0.736	0.945	1.047	0.131
1930	3468	8.072	2.975	2.579	2.831	0.736	0.945	1.051	0.131
1935	3473	7.779	2.938	2.585	2.796	0.736	0.945	1.051	0.131
1940	3478	7.64	2.888	2.566	2.748	0.736	0.942	1.047	0.131
1945	3483	7.631	2.876	2.547	2.736	0.739	0.945	1.047	0.136
1950	3488	7.628	2.873	2.535	2.732	0.739	0.939	1.044	0.136
1955	3493	7.744	2.885	2.529	2.745	0.742	0.942	1.041	0.136
1960	3498	7.908	2.913	2.532	2.774	0.742	0.939	1.041	0.136
1965	3503	7.93	2.929	2.544	2.79	0.745	0.942	1.041	0.141
1970	3508	7.983	2.941	2.557	2.802	0.745	0.942	1.041	0.141
1975	3513	7.968	2.941	2.563	2.802	0.749	0.945	1.044	0.146
1980	3518	7.98	2.944	2.57	2.805	0.749	0.945	1.047	0.151
1985	3523	7.961	2.944	2.573	2.805	0.749	0.945	1.051	0.146
1990	3528	7.977	2.947	2.573	2.805	0.745	0.945	1.051	0.151
1995	3533	7.974	2.944	2.573	2.805	0.745	0.942	1.051	0.146
2000	3538	7.949	2.944	2.576	2.809	0.749	0.945	1.047	0.151
2005	3543	7.952	2.941	2.576	2.805	0.745	0.942	1.051	-0.146
2010	3548	7.974	2.941	2.573	2.805	0.749	0.942	1.047	-0.146
2015	3553	7.943	2.941	2.576	2.805	0.752	0.945	1.047	0.151
2020	3558	7.917	2.938	2.573	2.802	0.745	0.945	1.047	-0.151
2025	3563	7.933	2.938	2.573	2.802	0.752	0.945	1.047	0.156
2030	3568	7.933	2.938	2.573	2.805	0.755	0.948	1.047	0.16
2035	3573	7.917	2.938	2.573	2.802	0.761	0.955	1.051	0.176
2040	3578	7.952	2.935	2.573	2.802	0.758	0.952	1.051	-0.171
2045	3583	7.961	2.938	2.573	2.799	0.758	0.948	1.054	0.16[illegible]
2050	3588	7.913	2.938	2.573	2.802	0.761	0.952	1.051	0.176
2055	3593	7.943	2.935	2.573	2.802	0.761	0.952	1.051	-0.176
2060	3598	7.98	2.935	2.573	2.802	0.761	0.948	1.051	-0.176
2065	3603	7.987	2.935	2.573	2.802	0.761	0.952	1.051	0.176
2070	3608	7.924	2.935	2.57	2.802	0.764	0.952	1.047	-0.181
2075	3613	7.971	2.935	2.573	2.805	0.768	0.955	1.051	-0.191
2080	3618	7.965	[illegible]	2.57	2.802	0.764	0.952	1.051	0.186
2085	3623	7.943	2.935	2.573	2.805	0.764	0.952	1.051	0.181
2090	3628	7.9[illegible]	2.932	2.57	2.802	0.764	0.948	1.051	0.181
2095	3633	7.936	2.932	2.573	2.805	0.768	0.952	1.051	-0.191
2100	3638	7.961	2.932	2.57	2.802	0.768	0.952	1.051	-0.186
2105	3643	7.961	2.932	2.57	2.805	0.771	0.955	1.051	-0.196
2110	3648	7.93	2.935	2.573	2.809	0.774	0.958	1.051	-0.211
2115	3653	7.993	2.935	2.573	2.805	0.78	0.961	1.054	-0.211
2120	3658	7.958	2.935	2.573	2.805	0.78	0.958	1.057	-0.217
2125	3663	7.95	2.932	2.573	2.805	0.78	0.958	1.054	0.211
2130	3668	7.943	2.932	2.573	2.805	0.777	0.955	1.057	0.211

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

6/7/99 14.20

Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
2135	3673	7.924	2.929	2.57	2.805	0.774	0.955	1.054	[illegible]
2140	3678	7.914	2.929	2.57	2.802	0.777	0.955	1.054	0.217
2145	3683	7.949	2.929	2.57	2.805	0.783	0.958	1.054	0.222
2150	3688	7.949	2.929	2.57	2.805	0.783	0.961	1.054	0.227
2155	3693	7.914	2.925	2.57	2.802	0.783	0.955	1.054	0.227
2160	3698	7.936	2.925	2.57	2.802	0.783	0.955	1.054	0.222
2165	3703	7.971	2.925	2.57	2.802	0.783	0.955	1.054	0.227
2170	3708	7.971	2.925	2.57	2.802	0.787	0.958	1.054	0.227
2175	3713	7.917	2.925	2.57	2.802	0.787	0.958	1.054	0.237
2180	3718	7.924	2.925	2.57	2.805	0.793	0.964	1.054	0.242
2185	3723	7.977	2.929	2.57	2.805	0.799	0.967	1.057	0.257
2190	3728	7.952	2.929	2.573	2.803	0.802	0.967	1.06	0.267
2195	3733	7.955	2.929	2.573	2.809	0.809	0.971	1.06	0.277
2200	3738	7.939	2.932	2.576	2.812	0.812	0.971	1.063	0.282
2205	3743	7.949	2.932	2.579	2.812	0.815	0.974	1.066	0.287
2210	3748	7.943	2.932	2.579	2.812	0.815	0.971	1.066	0.287
2215	3753	7.952	2.932	2.579	2.812	0.812	0.967	1.066	0.29
2220	3758	7.955	2.932	2.579	2.812	0.815	0.971	1.066	0.292
2225	3763	7.987	2.932	2.582	2.812	0.815	0.964	1.063	0.292
2230	3768	7.971	2.932	2.579	2.812	0.818	0.971	1.063	0.297
2235	3773	7.946	2.932	2.582	2.815	0.821	0.967	1.063	0.297
2240	3778	7.965	2.929	2.579	2.812	0.818	0.967	1.066	0.297
2245	3783	7.943	2.929	2.582	2.812	0.821	0.967	1.063	0.297
2250	3788	7.952	2.929	2.579	2.812	0.821	0.967	1.063	0.302
2255	3793	7.98	2.929	2.579	2.812	0.818	0.964	1.06	0.302
2260	3798	7.993	2.935	2.582	2.818	0.824	0.971	1.063	0.307
2265	3803	8.009	2.938	2.588	2.818	0.824	0.967	1.06	0.307
2270	3808	8.005	2.938	2.592	2.821	0.824	0.971	1.063	0.317
2275	3813	8.031	2.938	2.592	2.824	0.824	0.967	1.063	0.312
2280	3818	7.996	2.935	2.595	2.821	0.826	0.967	1.063	0.317
2285	3823	7.971	2.938	2.592	2.821	0.826	0.971	1.063	0.317
2290	3828	7.977	2.938	2.595	2.821	0.831	0.974	1.063	0.325
2295	3833	7.99	2.935	2.595	2.818	0.834	0.974	1.066	0.328
2300	3838	8.015	2.938	2.595	2.821	0.834	0.974	1.063	0.333
2305	3843	7.996	2.935	2.592	2.821	0.834	0.974	1.066	0.333
2310	3848	7.971	2.935	2.595	2.824	0.837	0.977	1.066	0.343
2315	3853	7.993	2.938	2.595	2.824	0.837	0.977	1.063	0.348
2320	3858	7.993	2.938	2.595	2.828	0.843	0.977	1.066	0.356
2325	3863	8.024	2.935	2.598	2.824	0.843	0.977	1.066	0.356
2330	3868	7.987	2.935	2.598	2.821	0.847	0.977	1.066	0.363
2335	3873	8.056	2.95	2.601	2.84	0.84	0.977	1.069	0.363
2340	3878	7.949	2.925	2.598	2.815	0.843	0.977	1.069	0.358
2345	3883	7.914	2.916	2.592	2.809	0.84	0.971	1.069	0.353
2350	3888	7.911	2.91	2.585	2.802	0.843	0.974	1.063	0.356
2355	3893	7.943	2.91	2.582	2.802	0.847	0.974	1.063	0.366
2360	3898	7.883	2.904	2.576	2.799	0.85	0.977	1.066	0.366
2365	3903	7.914	2.904	2.576	2.799	0.85	0.977	1.063	0.366
2370	3908	7.867	2.901	2.576	2.796	0.85	0.974	1.063	0.373
2375	3913	7.92	2.901	2.573	2.796	0.85	0.974	1.063	0.373
2380	3918	7.88	2.898	2.573	2.796	0.85	0.974	1.06	0.37
2385	3923	7.892	2.901	2.573	2.796	0.853	0.977	1.063	0.378
2390	3928	7.917	2.898	2.57	2.796	0.853	0.977	1.063	0.378
2395	3933	7.905	2.896	2.57	2.796	0.853	0.974	1.06	0.383
2400	3938	7.906	2.896	2.573	2.796	0.856	0.977	1.063	0.386
2405	3943	7.883	[illegible]	2.573	2.796	0.856	0.977	1.063	0.393
2410	3948	8.308	2.901	2.585	2.863	0.859	0.977	1.06	0.393
2415	3953	8.305	2.984	2.614	2.882	0.859	0.98	1.063	0.393
2420	3958	8.361	2.993	2.633	2.894	0.862	0.983	1.069	0.396
2425	3963	8.311	2.996	2.645	2.894	0.866	[illegible]	1.073	0.401

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
2430	3968	[illegible]	2.996	2.652	2.897	0.862	0.983	1.073	0.408
2435	3973	8.314	3.003	2.656	2.901	0.866	0.986	1.076	0.413
2440	3978	[illegible]	3.006	2.661	2.904	0.869	0.99	1.079	0.423
2445	3983	[illegible]	3.006	2.664	2.904	0.872	0.993	1.079	0.429
2450	3988	8.317	3.006	2.664	2.904	0.875	0.993	1.082	0.429
2455	3993	8.342	3.009	2.664	2.907	0.869	0.99	1.085	0.429
2460	3998	8.342	3.009	2.667	2.907	0.875	0.996	1.092	0.434
2465	4003	8.323	3.006	2.667	2.904	[illegible]	0.99	1.088	0.423
2470	4008	8.349	3.006	2.667	2.907	0.869	0.99	1.079	0.429
2475	4013	8.308	3.006	2.667	2.907	0.866	0.99	1.082	0.429
2480	4018	8.308	3.006	2.667	2.907	0.862	0.983	1.079	0.429
2485	4023	8.323	3.006	2.667	2.91	0.869	0.993	1.085	0.429
2490	4028	8.336	3.006	2.667	2.91	0.869	0.993	1.082	0.429
2495	4033	8.301	3.006	2.667	2.907	0.866	0.99	1.085	0.423
2500	4038	8.358	3.003	2.667	2.907	0.862	0.986	1.076	0.429
2505	4043	8.33	3.003	2.667	2.907	0.869	0.993	1.076	0.434
2510	4048	8.317	3.003	2.664	2.907	0.866	0.99	1.076	0.439
2515	4053	[illegible]	3.003	2.667	2.91	0.869	0.99	1.079	0.439
2520	4058	8.323	3.006	2.67	2.913	0.881	0.999	1.085	0.449
2525	4063	8.314	3.006	2.67	2.913	0.881	0.999	1.086	0.459
2530	4068	8.355	3.009	2.67	2.913	0.881	1.002	1.088	0.459
2535	4073	8.317	3.009	2.674	2.916	0.885	1.002	1.095	0.464
2540	4078	8.345	3.009	2.674	2.916	0.885	1.002	1.095	0.469
2545	4083	8.358	3.009	2.674	2.916	0.875	0.993	1.095	0.454
2550	4088	8.308	3.006	2.67	2.913	0.875	0.996	1.088	0.454
2555	4093	8.333	3.003	2.67	2.913	0.872	0.99	1.082	0.449
2560	4098	8.345	3.003	2.67	2.916	0.875	0.996	1.085	0.454
2565	4103	8.311	3.003	2.67	2.913	0.875	0.996	1.082	0.449
2570	4108	8.371	3.003	2.674	2.916	0.875	0.996	1.088	0.454
2575	4113	8.364	3.003	2.674	2.916	0.875	0.996	1.092	0.444
2580	4118	8.345	3	2.667	2.913	0.862	0.99	1.082	0.434
2585	4123	8.330	2.996	2.67	2.913	0.859	0.986	1.082	0.434
2590	4128	8.38	3	2.67	2.913	0.866	0.993	1.082	0.439
2595	4133	8.323	3.003	2.67	2.916	0.875	0.999	1.082	0.459
2600	4138	8.342	3.006	2.674	2.92	0.875	1.005	1.085	0.469
2605	4143	8.349	3.003	2.674	2.92	0.875	1.002	1.085	0.464
2610	4148	8.358	3.003	2.674	2.92	0.875	1.005	1.088	0.464
2615	4153	8.345	3.003	2.674	2.92	0.875	1.002	1.085	0.464
2620	4156	8.342	3.003	2.674	2.92	[illegible]	0.999	1.095	0.464
2625	4163	8.342	3.003	2.674	2.92	0.875	1.002	1.092	0.464
2630	4168	8.339	3	2.674	2.92	0.875	1.005	1.092	0.469
2635	4173	8.377	3	2.674	2.92	0.869	0.999	1.082	0.465
2640	4178	8.374	3.003	2.674	2.923	0.875	1.005	1.088	[illegible]
2645	4183	8.377	3.003	2.677	2.926	0.872	1.002	1.092	0.474
2650	4188	8.355	3.003	2.674	2.923	0.872	1.002	1.076	0.464
2655	4193	8.349	3.003	2.677	2.926	0.888	1.018	1.104	0.484
2660	4198	8.336	3	2.677	[illegible]	0.878	1.009	1.095	0.489
2665	4203	8.349	3.003	2.677	2.926	0.872	1.005	1.088	0.489
2670	4208	8.361	3.003	2.68	2.926	0.891	1.021	1.098	0.504
2675	4213	8.399	3	2.677	2.923	0.866	0.996	1.082	0.499
2680	4218	8.345	3	2.677	2.926	0.875	1.009	1.086	0.494
2685	4223	8.358	2.993	2.674	2.923	0.869	1.002	1.082	0.494
2690	4228	8.33	2.996	2.677	2.923	0.878	1.015	1.095	0.484
2695	4233	8.317	2.996	2.674	2.923	0.866	1.005	1.082	0.499
2700	4238	8.323	2.993	2.67	2.92	0.862	1.002	1.066	0.494
2705	4243	8.364	2.996	2.677	2.923	0.878	1.018	1.098	0.489
2710	4248	8.361	2.993	2.67	2.926	0.866	1.009	1.085	0.494
2715	4253	8.383	2.993	2.674	2.926	0.869	1.015	1.085	0.494
2720	4258	8.342	2.996	2.674	2.929	0.866	1.009	1.066	0.499

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
2725	4263	8.368	2.996	2.674	2.929	0.872	1.015	1.088	0.454
2730	4268	8.317	2.993	2.677	2.929	0.872	1.015	1.101	[illegible]
2735	4273	8.361	2.996	2.677	2.929	0.859	1.009	1.079	[illegible]
2740	4278	8.345	2.996	2.674	2.929	0.856	1.005	1.079	0.479
2745	4283	8.366	2.993	2.67	2.929	0.856	1.002	1.069	0.479
2750	4288	8.371	2.996	2.677	2.929	0.85	1.002	1.076	0.479
2755	4293	8.345	2.996	2.677	2.932	0.862	1.015	1.082	0.464
2760	4298	8.377	2.996	2.677	2.932	0.859	1.012	1.088	0.479
2765	4303	8.377	2.993	2.677	2.932	0.862	1.018	1.085	0.479
2770	4308	8.355	2.993	2.68	2.936	0.856	1.012	1.065	[illegible]
2775	4313	8.273	2.987	2.68	2.926	0.856	1.009	1.079	[illegible]
2780	4318	8.295	2.981	2.677	2.923	0.856	1.009	1.076	0.464
2785	4323	8.267	2.981	[illegible]	2.92	0.859	1.015	1.085	0.464
2790	4328	8.266	2.975	2.667	2.916	0.853	1.005	1.085	0.474
2795	4333	8.305	2.972	2.667	2.916	0.859	1.012	1.082	0.474
2800	4338	8.352	2.975	2.667	2.92	0.853	1.009	1.085	0.469
2805	4343	8.339	2.978	2.67	2.923	0.859	1.015	1.092	0.459
2810	4348	8.327	2.981	2.67	2.926	0.862	1.021	1.098	0.469
2815	4353	8.355	2.981	2.674	2.929	0.875	1.027	1.11	0.469
Step 3									
0	4353.001	8.22	2.978	2.667	2.923	0.853	1.012	1.085	0.464
0.0083	4353.0083	8.172	2.978	2.667	2.923	0.85	1.015	1.085	0.464
0.0166	4353.0166	8.084	2.978	2.667	2.923	0.853	1.012	1.085	0.464
0.025	4353.025	7.999	2.978	2.667	2.923	0.853	1.015	1.085	0.464
0.0333	4353.0333	7.905	2.975	2.667	2.923	0.853	1.015	1.085	0.464
0.0416	4353.0416	7.826	2.978	2.667	2.923	0.853	1.015	1.085	0.464
0.05	4353.05	7.757	2.978	2.667	2.923	0.853	1.012	1.085	0.464
0.0583	4353.0583	7.684	2.975	2.667	2.923	0.853	1.012	1.085	0.464
0.0666	4353.0666	7.618	2.975	2.667	2.923	0.853	1.015	1.085	0.469
0.075	4353.075	7.558	2.975	2.67	2.923	0.853	1.015	1.085	0.464
0.0833	4353.0833	7.495	2.975	2.67	2.92	0.853	1.015	1.085	0.469
0.0916	4353.0916	7.439	2.972	2.667	2.92	0.853	1.015	1.085	0.464
0.1	4353.1	7.382	2.972	2.67	2.92	0.853	1.015	1.085	0.464
0.1083	4353.1083	7.325	2.969	2.67	2.916	0.853	1.015	1.088	0.464
0.1166	4353.1166	7.269	2.969	2.667	2.916	0.853	1.015	1.088	0.464
0.125	4353.125	7.218	2.969	2.667	2.913	0.853	1.015	1.068	0.464
0.1333	4353.1333	7.165	2.966	2.667	2.913	0.853	1.015	1.085	0.464
0.1416	4353.1416	7.114	2.966	2.667	2.913	0.853	1.015	1.085	0.469
0.15	4353.15	7.058	2.963	2.67	2.91	0.853	1.015	1.085	0.464
0.1583	4353.1583	7.007	2.959	2.667	2.91	0.853	1.015	1.085	0.464
0.1666	4353.1666	6.954	2.956	2.667	2.907	0.853	1.015	1.066	0.464
0.175	4353.175	6.9	2.956	2.667	2.904	0.853	1.015	[illegible]	[illegible]
0.1833	4353.1833	6.847	2.953	2.67	2.904	0.853	1.015	1.088	0.464
0.1916	4353.1916	6.79	2.95	2.67	2.901	0.853	1.015	1.085	0.464
0.2	4353.2	6.74	2.947	2.67	2.897	0.853	1.015	1.088	0.464
0.2083	4353.2083	6.689	2.944	2.67	2.894	0.853	1.015	1.088	0.464
0.2166	4353.2166	[illegible]	2.944	2.67	2.894	0.853	1.015	1.085	0.464
0.225	4353.225	6.595	2.941	2.67	2.891	0.853	1.015	1.086	0.464
0.2333	4353.2333	6.547	2.938	2.67	2.888	0.856	1.013	1.088	0.469
0.2416	4353.2416	6.503	2.935	2.67	2.885	0.856	1.015	1.088	0.464
0.25	4353.25	6.459	2.932	2.667	2.882	0.853	1.015	1.088	0.464
0.2583	4353.2583	6.406	2.929	2.667	2.882	0.856	1.015	1.066	0.464
0.2666	4353.2666	6.349	2.925	2.67	2.878	0.856	1.015	1.085	0.464
0.275	4353.275	6.286	2.922	2.67	2.875	0.856	1.015	1.088	0.464
0.2833	4353.2833	6.22	2.919	2.67	2.872	0.856	1.015	1.088	0.464
0.2916	4353.2916	6.157	2.916	2.67	2.869	0.856	1.016	1.068	0.464
0.3	4353.3	6.094	2.913	2.67	2.866	0.856	[illegible]	1.088	0.464
0.3083	4353.3083	6.028	2.91	2.67	2.863	0.856	1.015	1.085	0.464
0.3166	4353.3166	5.965	2.904	2.67	2.859	0.856	1.018	1.088	0.464

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
0.325	4353.325	5.905	2.901	2.67	2.856	0.856	1.018	1.088	0.464
0.3333	4353.3333	5.845	2.898	2.67	2.853	0.856	1.018	1.088	0.464
0.35	4353.35	5.725	2.888	2.67	2.847	0.856	1.018	1.085	0.464
0.3666	4353.3666	5.615	2.879	2.67	2.837	0.859	1.018	1.088	0.464
0.3833	4353.3833	5.504	2.873	2.67	2.831	0.859	1.018	1.065	0.464
0.4	4353.4	5.4	2.864	2.67	2.824	0.859	1.018	1.088	0.464
0.4166	4353.4166	5.3	2.855	2.67	2.815	0.859	1.021	1.086	0.464
0.4333	4353.4333	[illegible]	2.845	[illegible]	2.809	0.859	1.021	1.088	0.464
0.45	4353.45	5.107	2.836	2.67	2.799	0.859	1.021	1.088	0.464
0.4666	4353.4666	5.022	2.827	2.667	2.79	0.859	1.021	1.085	0.464
0.4833	4353.4833	4.95	2.818	2.667	2.78	0.859	1.021	1.088	0.464
0.5	4353.5	4.85	2.808	2.667	2.771	0.859	1.021	1.092	0.464
0.5166	4353.5166	4.839	2.799	2.667	2.761	0.862	1.021	1.092	0.464
0.5333	4353.5333	4.795	2.787	2.667	2.752	0.862	1.021	1.092	0.464
0.55	4353.55	4.754	2.781	2.667	2.745	0.862	1.021	1.092	0.464
0.5666	4353.5666	4.716	2.766	2.667	2.736	0.862	1.024	1.095	0.464
0.5833	4353.5833	4.676	2.759	2.667	2.726	0.862	1.024	1.092	0.464
0.6	4353.6	4.635	2.75	2.664	2.717	0.862	1.024	1.095	0.464
0.6166	4353.6166	4.59	2.74	2.664	[illegible]	0.862	1.024	1.092	0.464
0.6333	4353.6333	4.534	2.728	2.664	2.701	0.862	1.024	1.092	[illegible]
0.65	4353.65	4.477	2.722	2.664	2.691	0.862	1.024	1.095	0.464
0.6666	4353.6666	4.414	2.713	2.664	2.685	0.862	1.024	1.095	0.464
0.6833	4353.6833	4.357	2.703	2.661	2.675	0.862	1.024	1.092	0.464
0.7	4353.7	4.313	2.694	2.661	2.669	0.862	1.024	1.095	0.464
0.7166	4353.7166	4.275	2.688	2.661	2.66	0.862	1.024	1.095	0.464
0.7333	4353.7333	4.244	2.679	2.661	2.65	0.862	1.024	1.095	0.464
0.75	4353.75	4.215	2.669	2.658	2.644	0.862	1.024	1.098	0.464
0.7666	4353.7666	4.184	2.663	2.656	2.634	0.862	1.024	1.095	0.464
0.7833	4353.7833	4.158	2.654	2.655	2.628	0.862	1.024	1.095	0.464
0.8	4353.8	4.13	2.645	2.655	2.618	0.862	1.024	1.098	0.464
0.8166	4353.8166	4.102	2.639	2.652	2.612	0.862	1.024	1.095	0.464
0.8333	4353.8333	4.076	2.629	2.652	2.606	0.862	1.024	1.098	0.464
0.85	4353.85	4.051	2.623	2.648	2.596	0.862	1.024	1.095	0.464
0.8666	4353.8666	4.026	2.614	2.648	2.59	0.862	1.021	1.095	0.464
0.8833	4353.8833	3.998	2.605	2.645	2.58	[illegible]	1.024	1.098	0.464
0.9	4353.9	3.976	2.602	2.642	2.574	[illegible]	1.021	1.098	0.464
0.9166	4353.9166	3.947	2.592	2.642	2.568	0.859	1.024	1.098	0.464
0.9333	4353.9333	3.922	2.586	2.639	2.561	0.862	1.021	1.098	0.464
0.95	4353.95	3.897	2.577	2.636	2.555	0.862	1.024	1.098	0.464
0.9666	4353.9666	3.872	2.571	2.633	2.545	0.859	1.024	1.098	0.464
0.9833	4353.9833	3.843	2.565	2.629	2.539	0.859	1.024	1.098	0.464
1	4354	3.815	2.558	2.626	2.533	0.862	1.021	1.098	0.464
1.2	4354.2	3.443	2.478	2.585	2.453	0.856	1.018	1.098	0.464
1.4	4354.4	3.285	2.407	2.536	2.377	0.853	1.015	1.095	0.464
1.6	4354.6	3.137	2.349	2.484	2.317	0.853	1.012	1.088	0.464
1.8	4354.8	3.001	2.296	2.437	2.26	0.853	1.012	1.085	0.464
2	4355	2.764	2.247	2.387	2.209	0.853	1.012	1.085	0.464
2.2	4355.2	2.591	2.197	2.339	2.155	0.853	1.012	1.085	0.464
2.4	4355.4	2.481	2.151	2.295	2.107	0.853	1.009	1.085	0.464
2.6	4355.6	2.398	[illegible]	2.251	2.06	0.85	1.005	1.088	0.464
2.8	4355.8	2.339	2.071	2.21	2.022	0.85	1.002	1.086	0.464
3	4356	2.291	2.04	2.172	1.987	0.85	1.002	1.082	0.469
3.2	4356.2	2.253	2.012	2.138	1.952	0.847	0.999	1.082	0.469
3.4	4356.4	2.222	1.984	2.103	1.923	0.843	0.996	1.079	0.469
3.6	4356.6	2.193	1.966	2.071	1.895	0.84	0.99	1.076	0.469
3.8	4356.8	2.168	1.944	2.046	1.869	0.837	0.986	1.076	0.469
4	4357	2.14	1.917	2.018	1.844	0.837	0.986	1.069	0.469
4.2	4357.2	[illegible]	1.892	1.989	1.825	0.837	0.983	1.069	0.469
4.4	4357.4	2.092	1.87	1.967	1.803	0.834	0.98	1.063	0.469

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
4.6	4357.6	2.073	1.855	1.946	1.787	0.834	0.98	1.063	0.469
4.8	4357.8	2.058	1.839	1.926	1.766	0.831	0.977	1.057	0.469
5	4358	2.036	1.821	1.904	1.749	0.831	0.977	1.054	0.469
5.2	4358.2	2.02	1.805	1.885	1.736	0.834	0.967	1.051	0.469
5.4	4358.4	2.004	1.79	1.87	1.72	0.84	0.983	1.051	0.469
5.6	4358.6	1.988	1.781	1.854	1.704	0.841	0.983	1.051	0.469
5.8	4358.8	1.976	1.768	1.838	1.692	[illegible]	0.986	1.047	0.469
6	4359	1.96	1.753	1.825	1.679	0.853	0.99	1.047	0.464
6.2	4359.2	1.95	1.744	1.813	1.666	0.853	0.99	1.051	0.464
6.4	4359.4	1.938	[illegible]	1.8	1.657	0.859	0.99	1.051	0.464
6.6	4359.6	1.925	1.722	1.791	1.647	0.862	0.993	1.057	0.469
6.8	4359.8	1.913	1.713	1.778	1.635	0.866	0.993	1.066	0.464
7	4360	1.903	1.704	1.766	1.625	0.869	0.996	1.073	0.469
7.2	4360.2	1.89	1.691	1.756	1.616	0.872	0.996	[illegible]	0.464
7.4	4360.4	1.878	1.682	1.747	1.606	0.875	0.999	1.079	0.464
7.6	4360.6	1.868	1.676	1.737	1.6	0.881	1.002	1.085	0.464
7.8	4360.8	1.859	1.667	1.731	1.59	0.881	1.002	1.088	0.469
8	4361	1.846	1.657	1.706	1.581	0.881	1.002	1.095	0.464
8.2	4361.2	1.837	1.651	1.696	1.571	0.885	1.002	1.098	0.469
8.4	4361.4	1.827	1.642	1.684	1.562	0.881	0.967	1.104	0.469
8.6	4361.6	1.818	1.633	1.677	1.555	0.878	0.993	1.104	0.464
8.8	4361.8	1.812	1.626	1.665	1.546	0.878	0.986	1.107	0.469
9	4362	1.802	1.617	[illegible]	1.539	0.878	0.986	1.098	0.469
9.2	4362.2	1.793	1.611	1.649	1.53	0.878	0.996	1.088	0.469
9.4	4362.4	1.783	1.602	1.639	1.523	0.875	0.99	1.076	0.469
9.6	4362.6	1.774	1.596	1.63	1.514	0.872	0.983	1.063	0.464
9.8	4362.8	1.767	1.589	1.62	1.511	0.872	0.983	1.054	0.469
10	4363	1.761	1.583	1.62	1.504	0.875	0.983	1.051	[illegible]
12	4365	1.682	1.522	1.579	1.441	0.856	0.955	1.003	[illegible]
14	4367	1.622	1.472	1.52	1.397	0.878	0.964	0.997	0.474
16	4369	1.565	1.426	1.469	1.352	0.847	0.92	0.946	0.469
18	4371	1.512	1.386	1.425	1.311	0.85	0.91	0.934	0.464
20	4373	1.458	1.355	1.397	1.285	0.885	0.936	0.946	0.459
22	4375	1.42	1.324	1.359	1.254	0.869	0.91	[illegible]	0.469
24	4377	1.389	1.296	1.324	1.225	0.866	0.901	0.877	0.469
26	4379	1.363	1.272	1.302	1.203	0.872	0.901	0.877	0.469
28	4381	1.335	1.247	1.28	1.184	0.888	0.904	0.883	0.474
30	4383	1.31	1.225	1.255	1.165	0.876	[illegible]	0.858	0.474
32	4385	1.288	1.204	1.233	1.143	0.878	0.662	0.845	0.474
34	4387	1.269	1.188	1.214	1.124	0.894	0.891	0.871	0.469
36	4389	1.241	1.167	1.192	1.108	0.872	0.866	0.82	0.474
38	4391	1.221	1.148	1.17	1.089	0.878	0.866	0.808	0.474
40	4393	1.202	1.13	1.154	1.076	0.888	0.869	0.808	0.474
42	4395	1.187	1.117	1.138	1.063	0.881	0.857	0.806	0.474
44	4397	1.171	1.102	1.122	1.051	0.888	0.66	0.811	0.474
46	4399	1.152	1.086	1.106	1.035	0.894	0.857	0.804	0.474
48	4401	1.136	1.074	1.094	[illegible]	0.891	0.85	[illegible]	0.474
50	4403	1.12	1.062	1.081	1.012	0.888	0.644	0.782	0.474
52	4405	1.108	1.049	1.069	1	0.891	0.841	0.779	0.474
54	4407	1.095	1.04	1.059	0.99	0.897	0.841	0.782	0.474
56	4409	1.082	1.028	1.047	0.981	0.894	0.835	0.776	0.479
58	4411	1.07	1.015	1.034	0.968	0.888	0.825	0.763	0.474
60	4413	1.057	1.006	1.024	0.958	0.885	[illegible]	0.751	0.474
62	4415	1.051	0.997	1.012	0.946	0.885	0.816	0.751	0.469
64	4417	1.035	0.985	1.002	0.939	0.888	0.812	0.741	0.474
66	4419	1.022	0.978	0.993	0.933	0.885	0.806	0.738	0.474
68	4421	1.013	0.969	0.987	0.924	0.891	0.812	0.735	0.474
70	4423	1.004	0.96	0.974	0.914	0.881	0.797	0.725	0.469
72	4425	0.994	0.95	0.965	0.908	0.878	0.793	[illegible]	0.474

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
74	4427	0.985	0.944	0.958	0.901	0.878	0.79	0.716	0.469
76	4429	0.975	0.935	0.949	0.892	0.881	0.793	0.722	0.464
78	4431	0.966	0.926	0.942	0.885	0.888	0.793	0.719	0.464
80	4433	0.959	0.92	0.933	0.882	0.881	0.784	0.71	0.464
82	4435	0.953	0.913	0.927	0.873	0.875	0.781	0.703	0.464
84	4437	0.944	0.907	0.92	0.866	0.875	0.778	0.7	0.464
86	4439	0.937	0.904	0.914	0.863	0.875	0.778	0.719	0.464
88	4441	0.928	0.895	0.905	0.854	0.891	0.79	0.707	0.464
90	4443	0.921	0.889	0.901	0.851	0.866	0.762	0.684	0.464
92	4445	0.918	0.883	0.895	0.844	0.862	0.755	0.662	0.464
94	4447	0.915	0.879	0.889	0.838	0.866	0.759	0.669	0.459
96	4449	0.906	0.873	0.883	0.835	0.866	0.755	0.662	0.459
98	4451	0.899	0.867	0.876	0.828	0.866	0.755	0.665	0.464
100	[illegible]	0.893	0.861	0.87	0.825	0.866	0.752	0.662	0.459
105	4458	0.88	0.849	0.864	0.812	0.862	0.743	0.656	0.459
110	4463	0.868	0.839	0.851	0.806	0.856	0.737	0.665	0.454
115	4468	0.855	0.827	0.835	0.793	0.866	0.74	0.659	0.444
120	4473	0.843	0.815	0.823	0.784	0.859	0.733	0.65	0.444
125	4478	0.833	0.808	0.816	0.774	0.851	0.724	0.634	0.444
130	4483	0.824	0.799	0.807	0.768	0.851	0.721	0.634	0.444
135	4488	0.814	0.79	0.797	0.758	0.843	0.711	0.621	0.439
140	4493	0.802	0.771	0.788	0.752	0.84	0.708	0.624	0.434
145	4498	0.792	0.771	0.778	0.746	0.834	0.702	0.615	0.434
150	4503	0.786	0.765	0.772	0.739	0.831	0.699	0.615	0.423
155	4508	0.776	0.759	0.766	0.733	0.834	0.702	[illegible]	0.413
160	4513	0.767	0.75	0.756	0.724	0.815	0.683	[illegible]	0.418
165	4518	0.76	0.741	0.747	0.717	0.812	0.676	0.59	0.413
170	4523	0.754	0.737	0.744	0.714	0.815	0.68	0.587	0.413
175	4528	0.748	0.734	0.737	0.708	0.818	0.683	0.59	0.408
180	4533	0.745	0.726	0.734	0.704	0.818	0.683	0.593	0.413
185	4538	0.738	0.722	0.728	0.701	0.809	0.67	0.59	0.413
190	4543	0.732	0.719	0.725	0.698	0.806	0.667	0.577	0.413
195	4548	0.729	0.716	0.719	0.692	0.809	0.667	0.587	0.413
200	4553	0.723	0.71	0.715	0.689	0.806	0.667	0.58	0.418
205	4558	0.719	0.707	0.709	0.685	[illegible]	0.664	0.58	0.423
210	4563	0.713	0.704	0.706	0.682	0.806	0.664	0.577	[illegible]
215	4568	0.71	0.697	0.703	0.676	0.799	0.661	0.58	[illegible]
220	[illegible]	0.704	0.691	0.696	0.673	0.796	0.654	0.574	0.418
225	[illegible]	0.7	0.691	0.693	0.67	0.793	0.654	0.571	0.416
230	4583	0.697	0.688	0.69	0.666	0.79	0.648	0.568	0.423
235	4588	0.691	0.682	0.684	0.663	0.787	0.648	0.564	0.423
240	4593	0.691	0.679	0.681	0.66	0.783	0.645	0.564	0.418
245	4598	0.685	0.676	0.678	0.654	0.787	0.645	0.571	0.416
250	4603	0.682	0.673	0.674	0.65	0.783	0.642	0.568	0.429
255	4608	0.678	0.67	0.671	0.65	0.78	0.638	0.561	[illegible]
260	4613	0.672	0.666	0.671	0.647	0.777	0.635	0.561	[illegible]
265	4618	0.672	0.663	0.665	0.644	0.777	0.632	0.558	0.429
270	4623	0.669	0.66	0.662	0.641	0.774	0.632	0.555	0.429
275	4628	0.666	0.657	0.662	0.638	0.771	0.629	0.555	0.429
280	4633	0.663	0.654	0.659	0.635	0.771	0.629	0.552	0.429
285	4638	0.656	0.651	0.652	0.635	0.768	0.626	0.552	0.423
290	4643	0.653	0.648	0.649	0.631	0.764	0.619	0.549	0.423
295	4648	0.653	0.645	0.646	0.628	0.761	0.619	0.549	0.429
300	4653	0.65	[illegible]	0.646	0.625	0.761	0.616	0.546	0.429
305	4658	0.647	0.639	0.643	0.622	0.758	0.616	0.546	0.423
310	4663	0.644	0.636	0.64	0.622	0.758	0.613	0.542	0.429
315	4668	0.641	0.636	0.637	0.619	0.758	0.613	0.542	0.434
320	4673	0.641	[illegible]	0.637	0.619	0.758	0.613	0.542	0.439
325	4678	0.637	0.633	0.633	0.616	0.758	0.613	0.542	0.444

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
330	4683	0.637	0.633	0.633	0.616	0.755	0.613	0.546	0.444
335	4688	0.634	0.629	0.63	0.612	0.755	0.61	0.546	0.449
340	4693	0.631	0.626	0.63	0.612	0.755	0.61	0.546	0.449
345	4698	0.628	0.626	0.627	0.609	0.752	0.607	0.542	0.454
350	4703	0.626	0.623	0.624	0.606	0.749	0.604	0.542	0.454
355	4708	0.625	0.62	0.621	0.606	0.745	0.604	0.542	0.454
360	4713	0.622	0.617	0.618	0.603	0.745	0.6	0.539	0.464
365	4718	0.622	0.617	0.621	0.603	0.745	0.6	0.539	0.464
370	4723	0.618	0.614	0.614	0.6	0.742	0.6	0.539	0.464
375	4728	0.618	0.611	0.614	0.597	0.742	0.597	0.536	0.469
380	4733	0.615	0.611	0.614	0.597	0.742	0.597	0.533	0.474
385	4738	0.612	0.611	0.611	0.597	0.739	0.597	0.53	0.479
390	4743	0.612	0.608	0.608	0.593	0.739	0.594	0.536	0.484
395	4748	0.612	0.608	0.608	0.593	[illegible]	0.597	0.533	[illegible]
400	4753	0.609	0.605	0.605	0.593	[illegible]	0.594	0.53	0.494
405	4758	0.609	0.605	0.605	0.59	[illegible]	0.591	0.533	0.499
410	4763	0.606	0.602	0.605	0.587	0.733	0.591	0.533	0.499
415	4768	0.603	0.599	0.599	0.587	0.733	0.588	0.53	0.499
420	4773	0.603	0.598	0.599	0.584	0.733	0.588	0.533	0.504
425	4778	0.599	0.595	0.596	0.584	0.73	0.585	[illegible]	0.504
430	4783	0.596	0.592	0.596	0.581	0.727	0.582	0.527	0.504
435	4788	0.596	0.592	0.592	0.581	0.73	0.585	0.53	0.509
440	4793	0.593	0.589	0.592	0.577	0.723	0.578	0.527	0.504
445	4798	0.587	0.586	0.586	0.574	0.717	0.572	0.523	0.499
450	4803	0.587	0.583	0.583	0.571	0.717	0.572	0.52	0.499
455	4808	0.584	0.58	0.583	0.571	0.717	0.572	0.514	0.499
460	4813	0.584	0.58	0.58	0.565	0.714	0.569	0.517	0.494
465	4818	0.584	0.58	0.58	0.568	0.714	0.569	[illegible]	0.499
470	4823	0.577	0.577	0.577	0.565	0.711	0.566	[illegible]	0.494
475	4828	0.577	0.574	0.573	0.565	0.711	0.566	0.514	0.494
480	4833	0.574	0.574	0.573	0.562	0.708	[illegible]	0.514	0.489
485	4838	0.574	0.571	0.57	0.558	0.711	0.566	0.511	0.494
490	4843	0.571	0.571	0.57	0.558	0.708	0.563	0.514	[illegible]
495	4848	0.568	0.568	0.542	0.555	0.704	0.559	0.508	0.489
500	4853	0.565	0.565	0.564	0.552	0.701	0.559	0.508	0.484
505	4858	0.565	0.565	0.564	0.552	0.701	0.556	0.508	0.484
510	4863	0.562	0.561	0.561	0.549	0.695	0.553	0.505	0.479
515	4868	0.562	0.558	0.558	0.546	0.695	0.55	0.501	0.479
520	4873	0.558	0.556	0.555	0.546	0.695	0.55	0.501	0.479
525	4878	0.558	0.556	0.556	0.546	0.698	0.55	0.498	0.464
0	4878.001	0.562	0.558	0.555	0.543	0.695	0.553	0.501	0.479
30	4908	0.549	0.549	0.548	0.536	0.689	0.544	0.495	0.484
60	4938	0.539	0.54	[illegible]	0.53	0.682	0.537	0.492	0.469
90	4968	0.53	0.528	[illegible]	0.52	0.673	0.528	0.486	0.479
120	4998	0.521	0.521	0.523	0.514	0.666	0.521	0.479	0.479
150	5028	0.514	0.512	0.514	0.504	0.66	0.515	0.47	0.479
180	5058	0.506	0.506	0.507	0.498	0.654	0.509	0.467	0.479
210	5088	0.496	0.497	0.501	0.492	0.647	0.502	0.46	0.484
240	5118	0.495	0.494	[illegible]	0.489	0.647	0.502	0.457	0.494
270	5148	0.489	0.487	[illegible]	0.483	0.638	0.49	0.451	0.474
300	5178	0.489	0.487	0.488	0.482	0.641	0.496	0.457	0.499
330	5208	0.489	0.487	0.488	0.482	0.641	0.496	0.457	0.519
360	5238	0.486	0.481	0.485	0.479	0.635	0.49	0.457	0.535
390	5268	0.483	0.476	0.482	0.479	0.635	0.49	0.457	0.555
420	5298	0.479	0.475	0.479	0.473	0.632	0.487	0.451	0.57
450	5328	0.476	0.472	0.476	0.465	0.629	0.483	0.451	0.58
480	5358	0.47	0.469	0.473	0.466	0.625	0.483	0.451	0.585
510	5388	0.47	0.469	0.469	0.469	0.625	0.48	0.445	0.6
540	5418	0.464	0.46	0.466	0.463	0.61	0.468	0.441	0.605

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
570	5448	0.464	0.463	0.473	0.466	0.625	0.483	0.445	0.615
600	5478	[illegible]	0.46	0.466	0.463	0.603	0.458	0.429	0.61
630	5508	0.461	0.457	0.463	0.46	0.613	0.468	0.441	0.615
660	5538	0.457	0.457	0.46	0.46	0.616	0.471	0.429	0.615
690	5568	0.454	0.45	0.46	0.45	0.619	0.474	0.426	0.615
720	5598	0.448	0.444	0.454	0.447	0.619	0.477	0.435	0.59
750	5628	0.448	0.441	0.454	0.447	0.61	0.461	0.426	0.585
780	5658	0.448	0.444	0.454	0.444	0.594	0.446	0.419	0.57
810	5688	0.448	[illegible]	0.45	0.444	0.591	0.442	0.416	0.555
840	5718	0.445	0.441	0.45	0.444	0.591	0.442	0.413	0.55
870	5748	0.448	0.441	0.454	0.444	0.587	0.439	0.41	0.535
900	5778	0.445	0.441	0.45	0.441	0.597	0.446	0.407	0.514
930	5808	0.445	0.438	0.45	0.438	0.578	0.43	0.407	0.494
960	5838	0.448	0.444	0.45	0.441	0.581	0.436	0.41	0.489
990	5868	0.448	0.441	0.45	0.441	0.584	0.433	0.41	0.484
1020	5898	0.448	0.441	0.45	0.441	0.584	0.436	0.41	0.469
1050	[illegible]	0.448	0.444	0.454	0.441	0.581	0.433	0.416	0.459
1080	[illegible]	0.451	0.441	0.454	0.444	0.575	0.427	0.416	0.449
1110	[illegible]	0.448	0.441	0.45	[illegible]	0.572	0.42	0.413	0.429
[illegible]	6018	0.448	0.441	0.45	0.441	0.568	0.417	0.413	0.413
[illegible]	6048	0.448	0.441	0.45	0.441	0.568	0.42	0.413	0.383
1200	6078	0.451	[illegible]	0.454	0.444	0.575	0.423	0.419	0.383
1230	6108	0.454	0.447	0.454	0.444	0.572	0.427	0.429	0.383
1260	6138	0.454	0.447	0.454	0.447	0.578	0.43	0.429	0.393
1290	6168	0.457	0.453	0.457	0.45	0.584	0.439	0.441	0.423
1320	6198	0.454	0.447	0.454	0.447	0.578	0.433	0.435	0.423
1350	6228	0.451	0.444	0.45	0.447	0.578	0.433	0.438	0.429
1380	6258	0.445	0.441	0.444	0.441	0.575	0.427	0.429	0.408
1410	6288	0.442	0.438	0.441	0.435	0.578	0.43	0.426	0.393
1440	6318	0.442	0.435	0.441	0.435	0.575	0.427	0.429	0.403
1470	6348	0.445	0.438	0.441	0.438	0.578	0.43	0.432	0.413
1500	6378	0.438	[illegible]	0.438	0.435	0.575	0.427	0.426	0.408
1530	[illegible]	0.435	0.429	0.435	0.428	0.565	0.417	0.422	0.393
1560	6438	0.435	0.429	0.432	0.428	0.568	0.423	0.422	0.413
1590	6468	0.432	0.426	0.428	0.428	0.572	0.423	0.422	0.413
1620	6498	0.432	0.426	0.428	0.425	0.572	0.423	0.419	0.418
1650	6528	0.426	0.423	0.428	0.422	0.565	0.417	0.419	0.403
1680	6558	0.429	0.423	0.425	0.422	0.568	0.42	0.416	0.413
1710	6588	0.423	0.416	0.419	0.419	0.562	0.414	0.41	0.398
1740	6618	0.423	0.419	[illegible]	0.416	0.565	0.42	0.416	0.403
1770	6648	0.423	0.416	0.419	0.416	0.565	0.417	0.416	0.403
1800	6678	0.419	0.413	0.416	[illegible]	0.562	0.417	0.416	0.398
1830	6708	0.416	0.41	0.41	[illegible]	0.562	0.414	0.413	[illegible]
1860	6738	0.423	0.416	0.422	0.416	[illegible]	0.417	0.419	[illegible]
1890	6768	0.419	0.413	0.419	0.412	0.568	0.42	0.413	0.406
1920	6798	0.416	0.41	0.416	0.409	0.565	0.417	0.41	0.403
1950	6828	0.416	0.41	0.416	0.409	0.562	0.417	0.413	0.398
1980	6858	0.419	0.413	0.419	0.412	0.562	0.414	0.4	0.434
2010	6888	0.416	0.413	0.416	0.412	0.565	0.417	0.41	0.418
2040	6918	[illegible]	0.41	0.416	0.409	0.572	0.427	0.426	0.408
2070	6948	[illegible]	0.41	0.419	0.412	0.553	0.404	0.404	0.429
2100	6978	0.419	0.413	0.419	0.416	0.565	0.42	0.397	0.449
2130	7008	0.423	0.419	0.428	0.422	0.584	0.436	0.457	0.454
2160	7038	0.416	0.41	0.416	0.412	0.54	0.395	0.385	0.444
2190	7068	0.413	0.407	[illegible]	0.412	0.549	0.404	0.413	0.439
2220	7098	0.423	0.419	[illegible]	0.422	0.562	0.414	0.404	0.434
2250	7128	0.426	0.419	0.428	0.422	0.572	0.423	0.422	0.418
2280	7158	0.423	0.419	0.425	0.419	0.562	0.414	0.407	[illegible]
2310	7188	0.426	0.419	0.428	0.422	0.581	0.433	0.441	0.408

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
2340	7218	0.426	0.423	0.428	0.422	0.568	0.42	0.41	[illegible]
2370	7248	0.432	0.426	0.428	[illegible]	0.559	0.411	0.4	0.416
2400	7278	0.426	0.419	0.428	[illegible]	0.549	0.404	0.4	[illegible]
2430	7308	0.426	0.419	0.425	0.422	0.543	0.398	0.388	0.383
2460	7338	0.432	0.426	0.426	0.425	0.568	0.42	0.419	0.348
2490	7368	0.429	0.426	0.432	0.422	0.553	0.408	0.419	0.358
2520	7398	0.429	0.423	0.428	0.422	0.559	0.411	0.413	0.343
2550	7428	0.429	0.423	0.425	0.422	0.562	0.414	0.413	0.338
2580	7458	0.426	0.419	0.425	0.422	0.562	0.414	0.413	0.333
2610	7488	0.426	0.419	0.425	0.419	0.562	0.414	0.416	0.323
2640	7518	0.426	0.419	0.422	0.419	0.559	0.414	[illegible]	0.312
2670	7548	0.419	0.413	0.419	0.412	0.556	0.408	[illegible]	[illegible]
2700	7578	0.423	0.416	0.422	0.412	0.559	0.411	0.413	[illegible]
2730	7608	0.429	0.423	0.425	0.419	0.568	0.42	0.419	0.317
2760	7638	0.429	0.426	0.428	0.422	0.568	0.423	0.426	0.333
2790	7668	0.426	0.423	0.425	0.419	0.565	0.42	0.419	0.333
2820	7698	0.426	0.419	0.422	0.419	0.568	0.423	0.422	0.336
2850	7728	0.423	0.419	0.422	0.416	0.562	0.417	0.419	0.323
2880	7758	0.419	0.413	0.416	0.412	0.562	0.414	0.413	0.307
2910	7788	0.413	0.407	0.413	0.406	0.556	0.411	0.41	0.287
2940	7818	0.416	0.41	0.413	0.405	0.562	0.414	0.41	[illegible]
2970	7848	0.41	0.404	0.41	0.403	[illegible]	0.408	0.407	0.272
3000	7878	0.41	0.404	0.406	0.403	[illegible]	0.408	0.407	0.257
3030	7908	0.407	0.404	0.403	0.4	0.549	0.404	0.404	0.237
3060	7938	0.407	0.401	0.403	0.396	0.553	0.404	0.404	0.232
3090	7968	0.404	0.398	0.4	0.396	0.549	[illegible]	0.4	0.211
3120	7998	0.401	0.398	0.4	0.393	0.549	0.404	0.4	0.201
3150	8028	0.404	0.398	0.4	0.396	0.553	0.404	0.4	[illegible]
3180	8056	0.404	0.398	0.4	0.393	0.553	0.404	0.404	0.191
3210	8088	0.407	0.401	0.403	0.4	0.559	0.411	0.407	[illegible]
3240	8118	0.407	[illegible]	0.406	0.4	0.559	0.414	0.407	0.211
3270	8148	0.41	0.407	0.406	0.403	0.565	0.417	0.413	0.227
3300	8178	0.41	0.404	0.403	0.4	0.559	0.414	0.41	[illegible]
3330	8208	0.41	0.404	0.406	0.403	0.562	0.414	0.413	0.227
3360	8238	0.41	0.404	0.406	0.403	0.565	0.417	0.413	[illegible]
3390	8268	0.41	0.404	0.406	0.403	0.565	0.417	0.413	0.237
3420	8298	0.41	0.404	0.406	0.403	0.562	0.414	0.41	0.237
3450	8328	0.41	0.404	0.406	0.403	0.562	0.417	0.407	[illegible]
3480	8358	0.407	0.404	0.406	0.403	0.562	0.417	0.413	0.232
3510	8388	0.404	0.398	0.4	0.396	0.556	0.408	0.404	0.211
3540	8418	0.404	0.401	0.403	0.396	0.559	0.414	0.394	0.211
3570	8448	0.41	0.404	0.406	0.403	0.562	0.414	0.4	[illegible]
3600	8478	0.41	0.404	0.406	0.403	0.562	0.414	0.4	0.222
3630	8508	0.407	0.401	0.403	0.4	0.553	0.408	0.366	0.201
3660	8538	0.401	0.392	0.397	0.39	0.524	0.382	0.353	0.161
3690	8568	0.401	0.395	0.397	0.391	0.546	0.401	0.394	0.121
3720	8598	0.401	0.395	0.397	0.393	0.549	0.408	0.391	0.121
3750	8628	0.391	0.389	0.394	0.384	0.537	0.395	0.391	0.09
3780	8658	0.385	0.376	0.381	0.374	0.534	0.389	0.372	0.065
3810	8688	0.375	0.37	0.378	0.368	0.562	0.417	0.419	0.075
3840	8718	0.359	0.355	0.362	0.352	0.562	0.414	0.404	0.065
3870	8748	0.347	0.339	0.34	0.336	0.537	0.392	0.369	0.03
3900	8778	0.337	0.333	0.337	0.327	0.543	0.395	0.369	[illegible]
3930	8806	0.331	0.324	0.324	0.32	0.518	0.373	0.35	[illegible]
3960	8838	0.337	0.33	0.331	0.327	0.531	0.389	0.372	0.005
3990	8868	0.341	0.333	0.334	0.327	0.531	0.385	0.366	0.005
4020	8898	0.341	0.333	0.334	0.33	0.524	0.379	0.359	0.015
4050	8928	0.344	0.336	0.337	0.333	0.534	0.389	0.372	0.025
4080	8958	0.347	0.339	0.34	0.336	0.537	0.392	0.381	0.015

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro Pressure
4110	8988	0.344	0.336	0.337	0.333	0.531	0.385	0.378	0.035
4140	9018	0.344	0.339	0.337	0.333	[illegible]	0.389	0.375	0.035
4170	9048	0.344	0.339	0.337	0.333	0.531	0.389	0.378	0.04
4200	9078	0.347	[illegible]	0.34	0.336	0.537	0.392	0.381	0.03
4230	9108	0.347	0.342	0.34	0.336	0.534	0.389	0.381	0.03
4260	9138	0.347	0.342	0.34	0.336	0.534	0.389	0.378	0.035
4290	9168	0.344	0.339	0.337	0.333	0.531	0.385	0.375	0.06
4320	9198	0.344	0.339	0.337	0.333	0.527	0.385	0.372	0.06
4350	9228	0.344	0.336	0.337	0.333	0.527	0.382	0.375	0.065
4380	9258	0.341	0.333	0.334	0.327	0.524	0.379	0.369	0.075
4410	9288	0.337	0.333	0.331	0.323	0.521	0.376	0.366	0.065
4440	9318	0.334	0.33	0.328	0.323	0.521	0.376	0.362	0.06
4470	9348	0.337	0.333	0.331	0.323	0.524	0.379	0.366	0.09
4500	9378	0.337	0.333	0.331	0.327	0.521	0.376	0.366	0.095
4530	9408	0.334	0.33	0.328	0.323	0.518	0.376	0.359	0.111
4560	9438	0.334	0.327	0.328	0.32	0.518	[illegible]	0.359	0.126
4590	9468	0.331	0.327	0.324	0.32	0.515	[illegible]	0.359	0.136
4620	9498	[illegible]	0.33	0.328	0.32	0.518	0.373	0.359	0.186
4650	9528	0.337	0.333	0.331	0.323	0.521	0.376	0.362	0.166
4680	9558	0.341	0.336	0.334	0.327	0.524	0.382	0.366	0.156
4710	9588	0.341	0.336	0.331	0.327	0.521	0.379	0.369	0.156
4740	9618	0.341	0.336	0.334	0.33	0.521	0.379	0.362	0.146
4770	9648	0.344	0.339	0.337	0.333	0.518	0.376	0.362	0.131
4800	9678	0.344	0.339	0.34	0.333	0.527	0.385	0.369	0.136
4830	9708	0.344	0.342	0.34	0.336	0.524	0.382	0.362	0.121
4860	9738	0.347	[illegible]	0.346	0.342	0.54	0.398	0.372	0.116
4890	9768	0.344	[illegible]	0.337	0.333	0.508	0.366	0.35	0.126
4920	9798	0.344	0.339	0.34	0.336	0.531	0.389	0.375	0.146
4950	9828	0.344	0.342	0.346	0.336	0.543	0.401	0.381	0.141
4980	9858	0.347	0.342	0.34	0.339	0.521	0.379	0.35	0.131
5010	9888	0.351	0.348	0.353	0.346	0.575	0.433	0.445	0.136
5040	9918	0.347	[illegible]	0.346	0.339	0.508	0.366	0.34	0.151
5070	9948	0.347	0.342	0.346	0.339	0.524	0.379	0.356	0.171
5100	9978	0.347	[illegible]	0.343	0.339	0.508	0.366	0.328	0.181
5130	10008	0.347	0.342	0.35	0.342	0.499	0.357	0.344	0.206
5160	10038	0.347	0.342	0.35	0.342	0.502	0.363	0.353	0.227
5190	10068	0.35	0.342	0.35	0.349	0.515	0.373	0.344	0.257
5220	10098	0.359	0.352	0.356	0.352	0.512	0.379	0.366	0.272
5250	10128	0.359	0.355	0.362	0.358	0.515	0.376	0.366	0.277
5280	10158	0.359	0.352	0.353	0.349	0.489	0.351	0.334	0.336
5310	10188	0.344	0.336	0.34	0.339	0.486	0.351	0.34	0.373
5340	10218	0.334	0.33	0.337	0.33	0.512	0.376	0.381	0.363
5370	10248	0.306	0.296	0.296	0.295	0.493	0.357	0.347	0.393
5400	10278	0.284	0.274	0.271	0.269	0.489	0.351	0.35	0.418
5430	10308	0.271	0.262	0.258	0.26	0.508	0.366	[illegible]	[illegible]
5460	10338	0.258	0.25	0.246	0.247	0.508	0.366	0.359	[illegible]
5490	10368	0.243	0.231	0.227	0.228	0.512	0.363	0.356	0.368
5520	10398	0.221	0.209	0.205	0.206	0.502	0.354	0.347	0.383
5550	10428	0.208	0.197	0.192	0.193	0.502	0.354	0.34	0.376
5580	10458	0.195	0.185	0.179	0.181	0.496	0.347	0.337	0.376
5610	10488	0.189	0.179	0.176	0.171	0.502	0.354	0.34	0.353
5640	10518	0.18	0.169	0.167	0.161	0.499	0.351	0.337	0.343
5670	10548	0.17	0.16	0.154	0.152	0.489	0.341	0.328	0.338
5700	10578	0.167	0.157	0.151	0.149	0.489	0.338	0.328	0.343
5730	10608	0.161	0.148	0.145	0.142	0.486	0.335	0.321	0.353
5760	10638	0.154	0.145	0.141	0.139	0.483	0.332	0.316	0.353
5790	10668	0.154	0.145	0.141	0.139	0.483	0.332	0.316	0.343
5820	10698	0.154	0.145	0.138	0.136	0.48	0.328	0.315	0.338
5850	10728	0.151	0.142	0.138	0.136	0.474	0.322	0.309	0.348

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

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Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
5880	10758	0.154	0.145	0.138	0.136	0.47	0.319	0.309	0.348
5910	10788	0.154	0.145	0.141	0.139	0.47	0.319	0.309	0.338
5940	10818	0.157	0.148	0.145	0.142	0.47	0.315	0.303	0.333
5970	10848	0.157	0.148	0.145	0.142	0.467	0.313	0.306	0.338
6000	10878	0.157	0.151	0.145	0.146	0.467	0.316	0.306	0.328
6030	10908	0.164	0.154	0.148	0.149	0.467	0.316	0.309	0.297
6060	10938	0.164	0.157	0.151	0.152	0.464	0.316	0.309	0.282
6090	10968	0.17	0.163	0.157	0.158	0.47	0.319	0.312	0.262
6120	10998	0.173	0.166	0.157	0.158	0.47	0.316	0.318	0.252
6150	11028	0.18	0.172	0.167	0.168	0.474	0.322	0.321	0.217
6180	11058	0.18	0.172	0.167	0.165	0.47	0.319	0.321	0.206
6210	11088	0.189	0.182	0.179	0.174	0.483	0.332	0.334	0.161
6240	11118	0.189	0.182	0.179	0.174	0.474	0.322	0.321	0.136
6270	11148	0.189	0.185	0.179	0.174	0.47	0.319	0.321	0.121
6300	11178	0.192	0.188	0.189	0.181	0.466	0.335	0.331	0.1
6330	11208	0.189	0.182	0.182	0.177	0.467	0.319	0.315	0.1
6360	11238	0.195	0.191	0.189	0.187	0.483	0.332	0.328	0.075
6390	11268	0.195	0.191	0.189	0.187	0.455	0.306	0.303	0.065
6420	11298	0.206	0.203	0.205	0.2	0.486	0.338	0.35	0.035
6450	11328	0.208	0.2	0.205	0.196	0.48	0.328	0.334	0.03
6480	11358	0.217	0.209	0.208	0.206	0.477	0.325	0.312	0.025
6510	11388	0.211	0.203	0.208	0.203	0.47	0.319	0.312	0.025
6540	11418	0.211	0.206	0.205	0.203	0.461	0.313	0.299	0.025
6570	11448	0.214	0.206	0.211	0.203	0.464	0.309	0.315	0.035
6600	11478	0.214	0.206	0.211	0.206	0.464	0.309	0.315	0.045
6630	11508	0.221	0.213	0.211	0.206	0.445	0.294	0.303	0.065
6660	11538	0.221	0.216	0.22	0.212	0.455	0.303	0.325	0.075
6690	11568	0.224	0.219	0.22	0.212	0.455	0.303	0.298	0.075
6720	11598	0.23	0.225	0.227	0.219	0.455	[illegible]	0.315	0.065
6750	11628	0.236	0.228	0.23	0.222	0.458	0.306	0.306	0.075
6780	11658	0.243	0.231	0.23	0.225	0.439	0.287	0.325	0.08
6810	11688	0.246	0.237	0.239	0.231	0.47	0.319	0.321	0.08
6840	11718	0.252	0.243	0.246	0.238	0.467	0.316	0.331	0.07
6870	11748	0.255	0.25	0.249	0.241	0.47	0.316	0.334	0.06
6900	11778	0.262	0.256	0.255	0.247	0.474	0.322	0.34	0.075
6930	11808	0.265	0.256	0.255	0.25	0.474	0.319	0.337	0.095
6960	11838	0.268	0.262	0.261	0.254	0.477	[illegible]	0.344	0.09
6990	11868	0.271	0.262	0.261	0.257	0.48	0.326	0.347	0.095
7020	11898	0.271	0.262	0.261	0.257	0.48	0.328	0.347	0.1
7050	11928	0.274	0.268	0.264	0.26	0.486	0.335	0.353	0.075
7080	11958	0.281	0.274	0.274	0.269	0.456	0.344	0.359	0.035
7110	11988	0.284	0.277	0.277	0.273	0.496	0.347	0.362	0.005
7140	12018	0.281	0.271	0.271	0.269	0.466	0.335	0.353	0.015
7170	12048	0.277	0.271	0.271	0.269	0.486	0.335	0.356	0.02
7200	12078	0.277	0.271	0.271	0.266	0.489	0.338	0.356	0.01
7230	12108	0.277	0.271	0.271	0.269	0.489	0.338	0.356	0.005
7260	12138	0.284	0.277	0.274	0.276	0.499	0.347	0.356	0.015
7290	12168	0.287	0.281	0.277	0.279	0.456	0.347	0.359	0.025
7320	12198	0.29	0.284	0.283	0.282	0.502	0.351	0.366	0.04
7350	12228	0.29	0.284	0.28	0.279	0.499	0.347	0.362	0.05
7380	12258	0.287	0.281	0.277	0.279	0.496	0.344	0.359	0.045
7410	12288	0.287	0.281	0.277	0.279	0.496	0.344	0.359	0.035
7440	12318	0.284	0.281	0.274	0.276	0.493	0.341	0.353	0.03
7470	12348	0.287	0.281	0.277	0.279	0.496	0.344	0.353	0.035
7500	12378	0.293	0.287	0.283	0.282	0.505	0.351	0.359	0.055
7530	12408	0.29	0.284	0.28	0.282	0.502	[illegible]	0.359	0.055
7560	12438	0.293	0.287	0.283	0.285	0.505	[illegible]	0.359	0.07
7590	12468	0.296	0.29	0.287	0.288	[illegible]	0.354	0.362	0.085
7620	12498	0.299	0.293	0.293	0.292	0.515	0.361	0.372	0.1

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999

6/7/99 14:20

Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
7650	12528	0.299	0.296	0.293	0.295	0.512	0.357	0.366	0.126
7680	12558	0.303	0.299	0.299	0.295	0.512	0.36	0.369	0.146
7710	12588	0.303	0.299	0.299	0.298	0.512	0.36	0.366	0.151
7740	12618	0.306	0.302	0.302	0.301	0.518	0.366	0.375	0.156
7770	12648	0.306	0.299	0.296	0.295	0.508	0.357	0.362	0.141
7800	12678	0.306	0.302	0.299	0.298	0.508	0.357	0.359	0.141
7830	12708	0.309	0.305	0.305	0.301	0.531	0.379	0.378	0.141
7860	12738	0.312	0.308	0.305	0.304	0.521	0.37	0.362	0.156
7890	12768	0.306	0.302	0.305	0.298	0.515	0.366	0.369	0.141
7920	12798	0.309	0.305	0.302	0.304	[illegible]	0.354	0.337	0.146
7950	12828	0.315	0.308	0.315	0.304	[illegible]	0.351	0.353	0.136
7980	[illegible]	0.315	0.311	0.312	0.304	0.496	0.347	0.34	0.121
8010	12888	0.318	0.314	0.321	0.311	0.518	0.366	0.372	0.111
8040	12918	0.318	0.311	0.312	0.308	0.518	0.366	0.356	0.09
8070	12948	[illegible]	0.314	0.318	0.311	0.505	0.357	0.359	0.07
8100	12978	0.316	0.314	0.315	0.308	0.502	0.351	0.34	0.04
8130	13008	0.322	0.318	0.324	0.314	0.512	0.36	0.372	0.03
8160	13038	0.331	0.327	0.328	0.32	0.512	0.36	0.366	0.01
8190	13068	0.328	0.324	0.324	0.317	0.508	0.357	0.359	0.01
8220	13098	0.331	0.324	0.328	0.32	0.499	0.351	0.35	0.02
8250	13128	0.334	0.33	0.331	0.323	0.512	0.36	0.362	0.025
8280	13158	0.334	0.327	0.328	0.32	0.508	0.36	0.369	0.05
8310	13188	0.337	0.33	0.331	0.323	0.512	0.36	0.366	0.065
[illegible]	13218	0.341	0.336	0.334	0.323	0.515	0.363	0.372	0.065
8370	13248	0.344	0.339	0.337	0.33	0.518	0.37	0.378	0.06
8400	13278	0.344	0.339	0.337	0.327	0.518	0.366	0.378	0.06
8430	13308	0.341	0.336	0.334	0.323	0.515	0.363	0.375	0.095
8460	13338	0.337	0.333	0.334	0.323	0.515	0.363	0.375	0.111
8490	13368	0.344	0.339	0.337	0.33	0.524	0.376	0.381	0.09
8520	13398	0.35	0.345	0.343	0.333	0.531	0.379	0.388	0.075
8550	13428	0.35	0.345	0.343	0.336	0.534	0.382	0.391	0.06
8580	13458	0.35	0.345	0.343	0.336	0.531	0.382	0.391	0.065
8610	13488	0.353	0.348	0.346	0.339	0.534	0.385	0.391	0.05
8640	13518	0.35	0.345	0.343	0.333	0.527	0.376	0.388	0.07
8670	13548	0.35	0.345	0.337	0.336	0.54	0.389	0.385	0.055
8700	13578	0.356	[illegible]	[illegible]	0.342	0.543	0.392	0.397	0.04
8730	13608	0.356	0.352	0.35	0.342	0.543	0.392	0.394	0.04
8760	13638	0.353	0.348	0.346	0.339	0.537	0.385	0.394	0.05
8790	13668	0.344	0.339	0.34	0.33	0.524	0.376	0.385	0.085
8820	13698	0.341	0.336	0.334	0.327	0.524	0.376	0.375	0.105
8850	13728	0.337	0.333	0.331	0.32	0.521	0.37	0.372	0.136
8880	13758	0.337	0.336	0.334	0.323	0.524	0.373	0.375	0.131
8910	13788	0.337	0.333	0.331	0.32	0.524	0.373	0.375	0.146
8940	13818	0.344	0.335	0.337	0.33	0.534	0.382	0.378	0.121
8970	13848	0.347	0.342	0.34	0.33	0.537	0.385	0.385	0.116
9000	13878	0.353	0.348	0.343	0.336	0.543	0.392	0.391	0.09
9030	13908	0.356	0.352	0.346	0.339	0.546	0.395	0.394	0.075
9060	13938	0.356	0.352	0.35	0.342	0.546	0.395	0.391	0.065
9090	13968	0.356	0.355	0.353	0.346	0.549	0.398	0.394	0.05
9120	13998	0.353	0.352	0.35	0.339	0.543	0.395	0.394	0.065
9150	14028	0.356	0.352	0.35	0.342	0.546	0.395	0.391	0.05
9180	14058	0.356	0.355	0.353	0.346	0.546	0.398	0.391	0.045
9210	14088	0.35	0.348	0.346	0.339	0.543	0.392	0.385	0.06
9240	14118	[illegible]	0.348	0.346	0.339	0.546	0.392	0.385	0.06
9270	[illegible]	[illegible]	0.352	0.35	0.342	0.549	0.398	0.385	0.045
9300	14178	0.356	0.355	0.353	0.346	0.534	0.382	0.375	0.045
9330	14208	0.363	0.361	0.359	0.352	0.549	0.395	0.381	0.045
9360	14238	0.363	0.361	0.359	0.352	0.549	0.398	0.386	0.06
9390	14268	0.369	0.364	0.362	0.355	0.556	0.404	0.394	0.05

Constant Rate Aquifer Test at Well PW, NL Industries Site, Pedricktown, NJ, 7 June 1999									
6/7/99 14:20									
Elapsed Time	Total Elapsed	Well PW	Well OW	Well KS	Well KD	Well 27	Well 28	Well SD	Baro. Pressure
9420	14298	0.369	0.367	0.362	0.355	0.553	0.401	0.388	0.055
9450	14328	0.369	0.367	0.365	0.355	0.553	0.401	0.397	0.06
9480	14358	0.366	0.364	0.362	0.352	0.553	0.404	0.4	0.08
9510	14388	0.369	0.364	0.362	0.355	0.549	0.398	0.394	0.075
9540	14418	0.372	0.367	0.365	0.358	0.553	0.401	0.388	0.07
9570	14448	0.375	0.37	0.369	0.362	0.556	0.404	0.4	0.08
9600	14478	0.378	0.376	0.372	0.365	0.559	0.408	0.404	0.07
9630	14508	0.375	0.373	0.372	0.365	0.562	0.411	0.407	0.08
9660	14538	0.378	0.376	0.372	0.365	0.559	0.408	0.4	0.075
9690	14568	0.375	0.37	0.369	0.362	0.559	0.408	0.4	0.075
9720	14598	0.375	0.373	0.369	0.362	0.562	0.411	0.404	0.08
9750	14628	0.378	0.373	0.369	0.365	0.565	0.414	0.404	0.07
9780	14658	0.382	0.376	0.372	0.368	0.568	0.417	0.404	0.06
9810	14688	0.382	0.379	0.375	0.371	0.568	0.417	0.41	0.055
9840	14718	0.382	0.379	0.375	0.371	0.572	0.42	0.41	0.04
9870	14748	0.382	0.379	0.375	0.371	0.572	0.42	0.413	0.025
9900	14778	0.382	0.379	0.375	0.371	0.568	0.417	0.407	0.03
9930	14808	0.385	0.382	0.378	0.374	0.575	0.423	0.413	0.01
9960	14838	0.388	0.385	0.381	0.377	0.581	0.43	0.416	-0.015
9990	14868	0.385	0.385	0.378	0.377	0.578	0.427	0.413	-0.015
10020	14898	0.388	0.389	0.381	0.381	0.581	0.43	0.419	-0.035
10050	14928	0.394	0.392	0.384	0.387	0.584	0.433	0.419	-0.055
10080	14958	0.391	0.389	0.384	0.384	0.584	0.433	0.422	-0.055
10110	14988	0.391	0.392	0.384	0.384	0.584	0.433	0.419	-0.065
10140	15018	0.391	0.389	0.384	0.384	0.584	0.433	0.419	-0.08
10170	15048	0.388	0.389	0.381	0.384	0.581	0.433	0.419	-0.085
10200	15078	0.388	0.389	0.381	0.384	0.581	0.43	0.416	-0.09
10230	15108	0.391	0.389	0.384	0.384	0.581	0.43	0.416	-0.095
10260	15138	0.388	0.385	0.381	0.381	0.581	0.43	0.416	-0.09
10290	15168	0.388	0.385	0.378	0.381	0.578	0.427	0.413	-0.08
10320	15198	0.388	0.389	0.381	0.384	0.584	0.43	0.413	-0.085
10350	15228	0.391	0.392	0.384	0.387	0.591	0.436	0.419	-0.1
10380	15258	0.394	0.395	0.387	0.39	0.594	0.442	0.426	-0.121
10410	15288	0.397	0.398	0.391	0.393	0.597	0.446	0.426	-0.136
10440	15318	0.401	0.401	0.394	0.396	0.6	0.449	0.432	-0.166
10470	15348	0.407	0.407	0.4	0.4	0.606	0.452	0.438	-0.217
10500	15378	0.407	0.407	0.397	0.4	0.606	0.452	0.435	-0.237
10530	15408	0.407	0.407	0.4	0.4	0.603	0.452	0.435	-0.252
10560	15438	0.407	0.407	0.4	0.403	0.603	0.452	0.438	-0.272
10590	15468	0.41	0.41	0.403	0.406	0.613	0.458	0.438	-0.302
10620	15498	0.413	0.413	0.406	0.409	0.619	0.468	0.438	-0.338
10650	15528	0.413	0.413	0.41	0.412	0.622	0.468	0.438	-0.353
10680	15558	0.41	0.407	0.403	0.403	0.613	0.461	0.454	-0.363
end of data									

APPENDIX I

WATER LEVEL INDICATOR DATA TABLES

SUPPLEMENTARY AQUIFER TEST DATA

Constant Rate Aquifer Test at Well PW, 7 June 1999

NL INDUSTRIES

PEDRICKTOWN, NEW JERSEY

Date	Observation Wells																	
	SD	SS	S4-1	T2-3	TC	T-4	T-A	OS	OD	11	PD	BR	PS	PW	OW	KS	KD	24
6/7/99 DTW:	7.15	6.11	5.20	6.76	7.25	7.31	7.58	7.63	8.33	5.41	6.85	5.50	5.72	6.18	6.49	6.04	6.27	17.56
Time:	1301	1302	1303	1304	1305	1305	1306	1307	1307	1325	1312	1314	1326	1324	1324	1325	1326	1329
	na	na	5.50	6.82	7.28	7.36	7.63	7.68	8.37	5.45	6.88	5.54	5.76	na	na	8.15	8.52	17.52
	na	na	1456	1506	1507	1509	1508	1525	1526	1538	1529	1532	1530	na	na	1730	1730	1727
	7.76	6.46	5.77	6.90	7.32	7.42	7.71	7.73	8.41	5.49	6.92	5.57	5.79	13.49	9.19	8.29	8.68	17.52
	1906	1906	1907	1908	1909	1910	1911	1911	1912	1914	1915	1918	1916	2023	2021	2024	2025	2030
	7.81	6.53	5.82	6.91	7.34	7.42	7.72	7.75	8.41	5.50	6.92	5.58	5.81	na	na	na	na	na
	2126	2127	2128	2131	2134	2136	2135	2138	2139	2142	2144	2148	2145	na	na	na	na	na
6/8/99	7.88	6.61	5.89	6.92	7.35	7.41	7.72	7.73	8..38	5.47	6.92	5.57	5.81	13.70	9.28	8.28	na	17.53
	0537	0537	0538	0539	0540	0541	0541	0542	0542	0544	0546	0544	0548	0413	0415	0415	na	0422
	7.90	6.62	5.92	6.95	7.38	7.45	7.75	7.79	8.42	5.50	6.95	5.59	5.92	na	na	8.47	8.88	17.59
	1004	1005	1005	1007	1008	1009	1009	1010	1011	1013	1014	1017	1016	na	na	1223	1223	1222
	7.82	6.56	5.87	6.96	7.40	7.51	7.79	7.84	8.49	5.55	6.98	5.64	5.86	13.21	9.13	8.33	8.73	17.64
	1701	1702	1703	1704	1704	1705	1705	1707	1707	1709	1710	1713	1710	1659	1700	1727	1727	1230
	7.97	6.69	6.00	7.01	7.43	7.52	7.82	7.89	8.50	5.57	7.01	5.67	5.88	13.48	9.26	8.45	8.87	17.76
	2237	2238	2239	2242	2243	2245	2246	2247	2249	2252	2253	2257	2254	2301	2303	2305	2306	2309

DTW = depth to water

SUPPLEMENTARY AQUIFER TEST DATA

Constant Rate Aquifer Test at Well PW, 7 June 1999

NL INDUSTRIES
PEDRICKTOWN, NEW JERSEY

Date	Observation Wells																	
	SD	SS	S4-1	T2-3	TC	T-4	T-A	OS	OD	11	PD	BR	PS	PW	OW	KS	KD	24
6/9/99	7.99	6.76	6.03	6.90	7.44	7.57	7.85	7.85	8.49	5.59	7.00	5.66	5.87	13.61	9.29	8.48	8.91	17.82
	0531	0532	0533	0535	0536	0536	0536	0539	0540	0542	0543	0543	0543	0549	0530	0551	0551	0554
	na	na	na	na	na	na	na	na	na	na	na	na	na	13.64	9.31	na	na	na
	na	na	na	na	na	na	na	na	na	na	na	na	na	1030	1030	na	na	na
	8.04	6.82	6.07	6.92	7.48	7.60	7.89	7.93	8.54	5.62	7.06	5.70	5.92	13.69	9.32	8.64	9.12	17.75
	1156	1156	1157	1158	1159	1200	1201	1203	1203	1205	1206	1209	1208	1213	1214	1310	1310	1225
	8.08	6.86	6.13	6.97	7.51	7.64	7.93	7.95	8.59	5.65	7.08	5.73	5.95	14.34	9.52	8.70	9.18	17.64
	1635	1635	1636	1638	1639	1640	1640	1641	1641	1645	1646	1648	1647	1652	1653	1657	1656	1700
	8.13	6.92	6.17	7.00	7.52	7.65	7.94	7.98	8.61	5.68	7.12	5.76	5.98	14.44	9.57	8.75	9.24	17.69
	2046	2046	2047	2056	2057	2058	2059	2101	2103	2105	2053	2051	2052	2110	2111	2114	2115	2118
6/10/99	8.14	6.97	6.18	7.01	7.55	7.65	7.96	7.92	8.58	5.64	7.09	5.78	5.96	14.13	9.45	8.67	9.17	17.90
	0520	0521	0520	0523	0524	0525	0525	0527	0528	0530	0531	0534	0532	0537	0538	0539	0539	0543
	8.17	7.01	6.20	7.02	7.55	7.66	7.96	7.96	8.58	5.60	7.09	5.74	5.96	14.50	9.51	8.77	9.27	17.92
	1324	1325	1325	1328	1329	1329	1330	1331	1332	1334	1335	1337	1335	1342	1342	1343	1344	1346

SUPPLEMENTARY AQUIFER TEST DATA

Constant Rate Aquifer Test at Well PW, 7 June 1999

NL INDUSTRIES

PEDRICKTOWN, NEW JERSEY

Date	Observation Wells														
	JD	JS	10R	ID	IS	HD	HS	28	27	30	29	32	31	RD	RS
6/7/99	7.48	7.38	17.31	10.55	8.19	13.65	13.80	10.92	11.07	11.13	10.79	9.77	9.21	9.58	7.42
	1329	1330	1335	1338	1338	1341	1342	1340	1341	1343	1343	1346	1347	1346	1347
	7.52	7.43	17.28	10.56	8.21	13.67	13.81	11.38	11.47	11.15	10.88	9.81	9.24	na	na
	1728	1728	1736	17.56	1756	1753	1752	1739	1740	1743	1743	1748	1748	na	na
	7.56	7.46	17.27	10.58	8.23	13.70	13.84	11.49	11.58	11.18	10.91	9.82	9.26	9.61	7.44
	2031	2032	2040	2041	2042	2045	2046	2104	2103	2059	2100	2055	2053	2109	2111
	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
6/8/99	7.60	7.49	17.28	10.60	5.22	13.71	13.84	11.58	11.72	11.20	10.91	9.81	9.26	9.61	7.44
	0424	0423	0427	0429	0430	0436	0437	0455	0457	0451	0458	0448	0447	0447	0443
	7.64	7.59	17.35	10.63	8.25	13.72	13.86	11.65	11.73	11.22	10.96	9.84	9.27	9.62	7.46
	1229	1228	1231	1233	1234	1236	1237	1250	1249	1248	1247	1244	1244	1241	1241
	7.68	7.58	17.41	10.65	8.30	13.76	13.89	11.62	11.70	11.23	10.97	9.88	9.31	9.69	7.49
	1731	1731	1735	1736	1737	1740	1740	1751	1751	1748	1749	1746	1746	1743	1744
	7.70	7.60	17.53	10.69	8.31	13.80	13.93	11.71	11.79	11.26	10.99	9.90	9.31	9.67	na
	2311	2312	2314	2316	2317	2320	2322	2340	2339	2335	2337	2332	2331	2326	na

SUPPLEMENTARY AQUIFER TEST DATA

Constant Rate Aquifer Test at Well PW, 7 June 1999

NL INDUSTRIES

PEDRICKTOWN, NEW JERSEY

Date	Observation Wells														
	JD	JS	10R	ID	IS	HD	HS	28	27	30	29	32	31	RD	RS
6/9/99	7.73	7.62	17.58	10.71	8.32	13.82	13.95	11.76	11.85	11.27	11.03	9.89	9.33	9.70	7.49
	0555	0555	0557	0559	0600	0603	0602	0615	0614	0612	0613	0609	0609	0606	0607
	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	7.79	7.69	17.51	10.74	8.37	13.83	13.97	11.81	11.89	11.31	11.04	9.93	9.35	9.71	7.51
	1227	1227	1229	1232	1232	1236	1236	1251	1251	1247	1247	1244	1244	1239	1238
	7.81	7.72	17.41	10.75	8.38	13.84	13.97	11.85	11.93	11.32	11.05	9.96	9.36	9.71	7.51
	1700	1701	1703	1705	1705	1708	1708	1722	1722	1719	1720	1716	1715	1712	1712
	7.85	7.74	17.44	10.79	8.41	13.88	14.02	11.90	11.98	11.34	11.08	9.97	9.39	9.73	7.52
	2121	2122	2125	2127	2128	2132	2133	2153	2152	2148	2149	2144	2142	2137	2138
6/10/99	7.89	7.81	17.66	10.82	8.42	13.90	14.03	11.93	12.01	11.37	11.11	9.98	9.38	9.76	7.56
	0544	0544	0547	0549	0550	0610	0610	0711	0710	0708	0709	0706	0705	0702	0702
	7.91	7.82	17.67	10.83	8.43	13.89	14.03	11.96	12.03	11.36	11.10	9.97	9.40	9.77	7.57
	1347	1347	1349	1350	1351	1353	13.53	1404	1403	1401	1402	1400	13.58	1356	1357